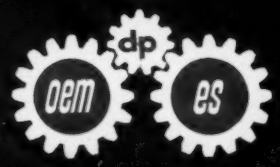
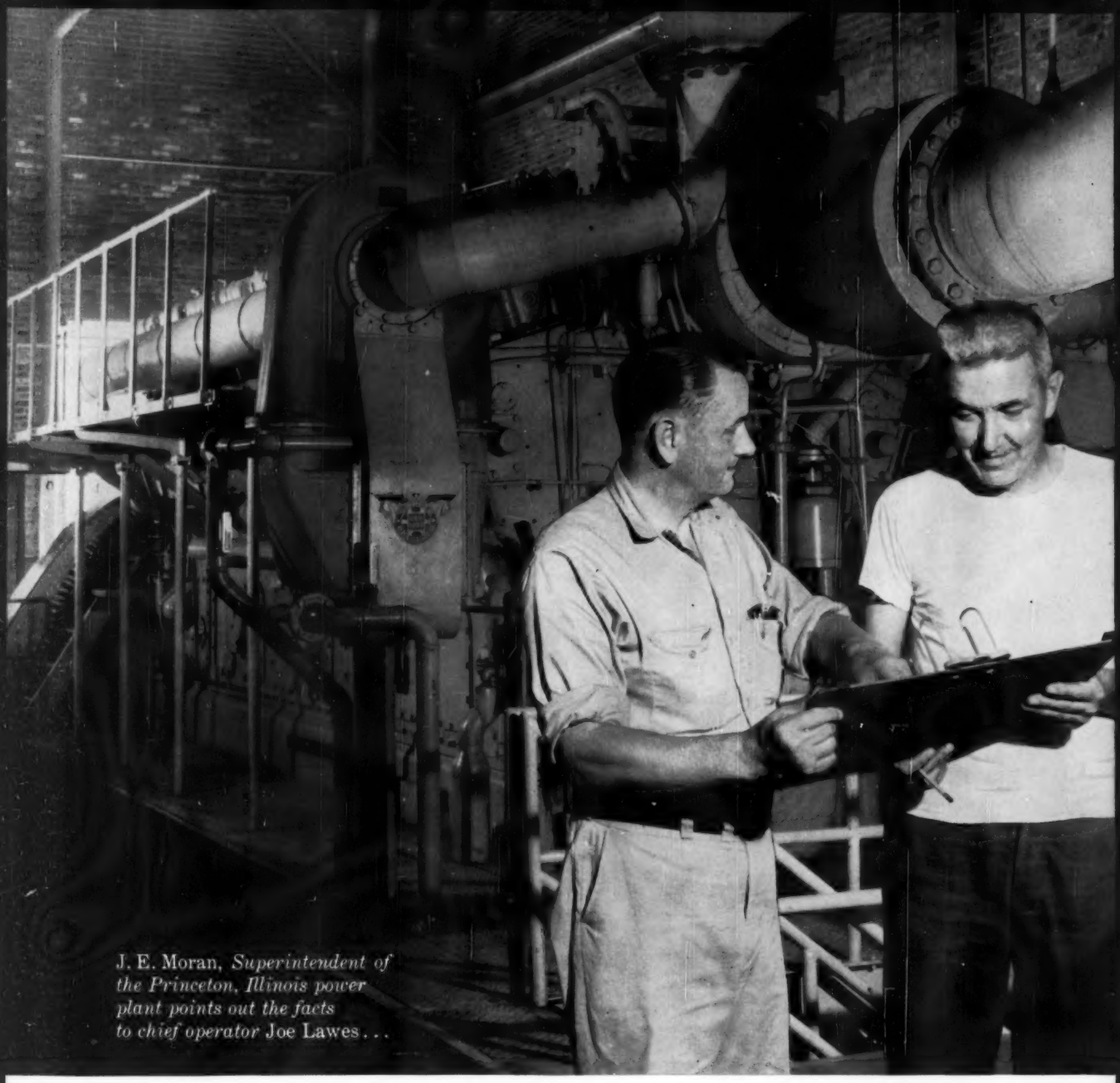
April 1961

diesel power

geared to the original equipment manufacturers and equipment superintendents in the field



engine specifications



J. E. Moran, *Superintendent of the Princeton, Illinois power plant points out the facts to chief operator* Joe Lawes . . .

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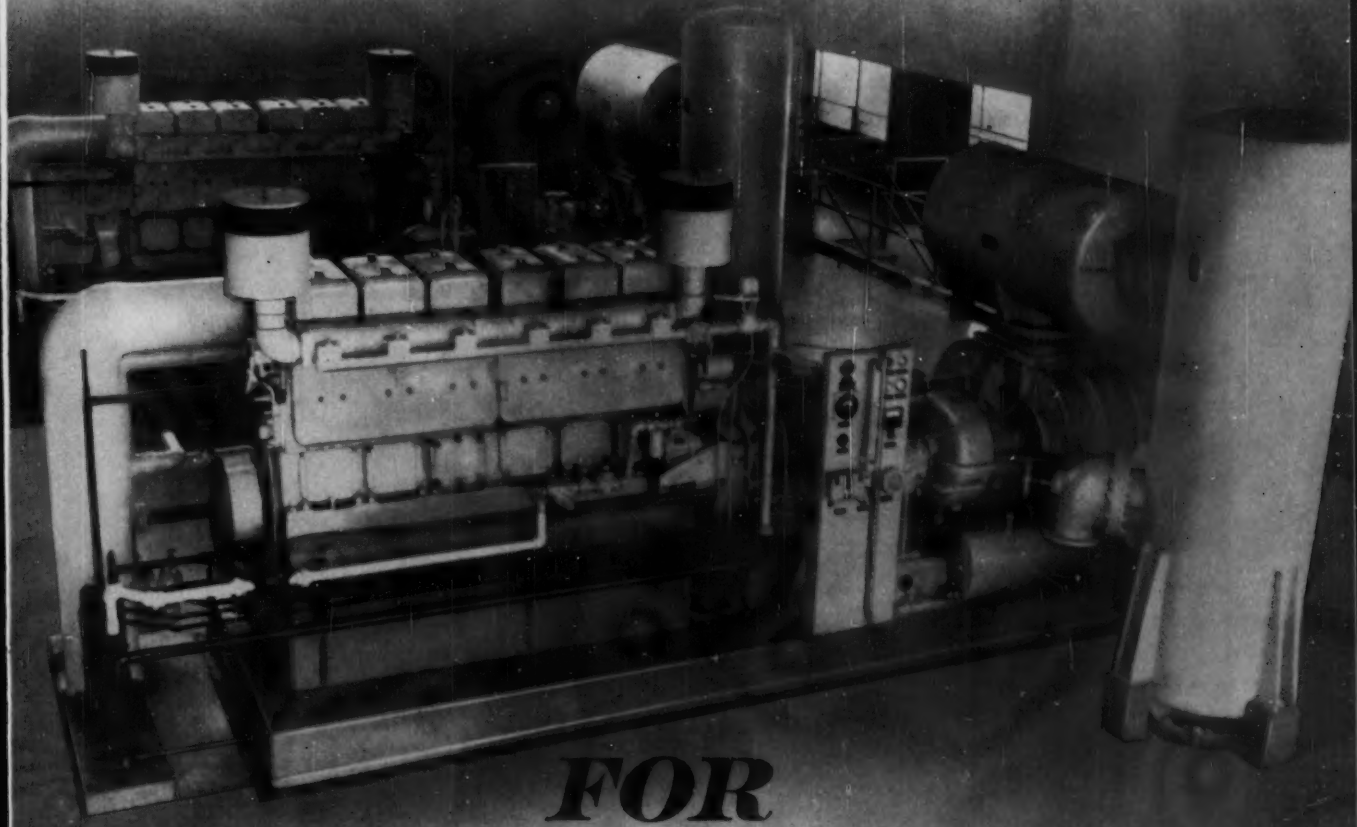

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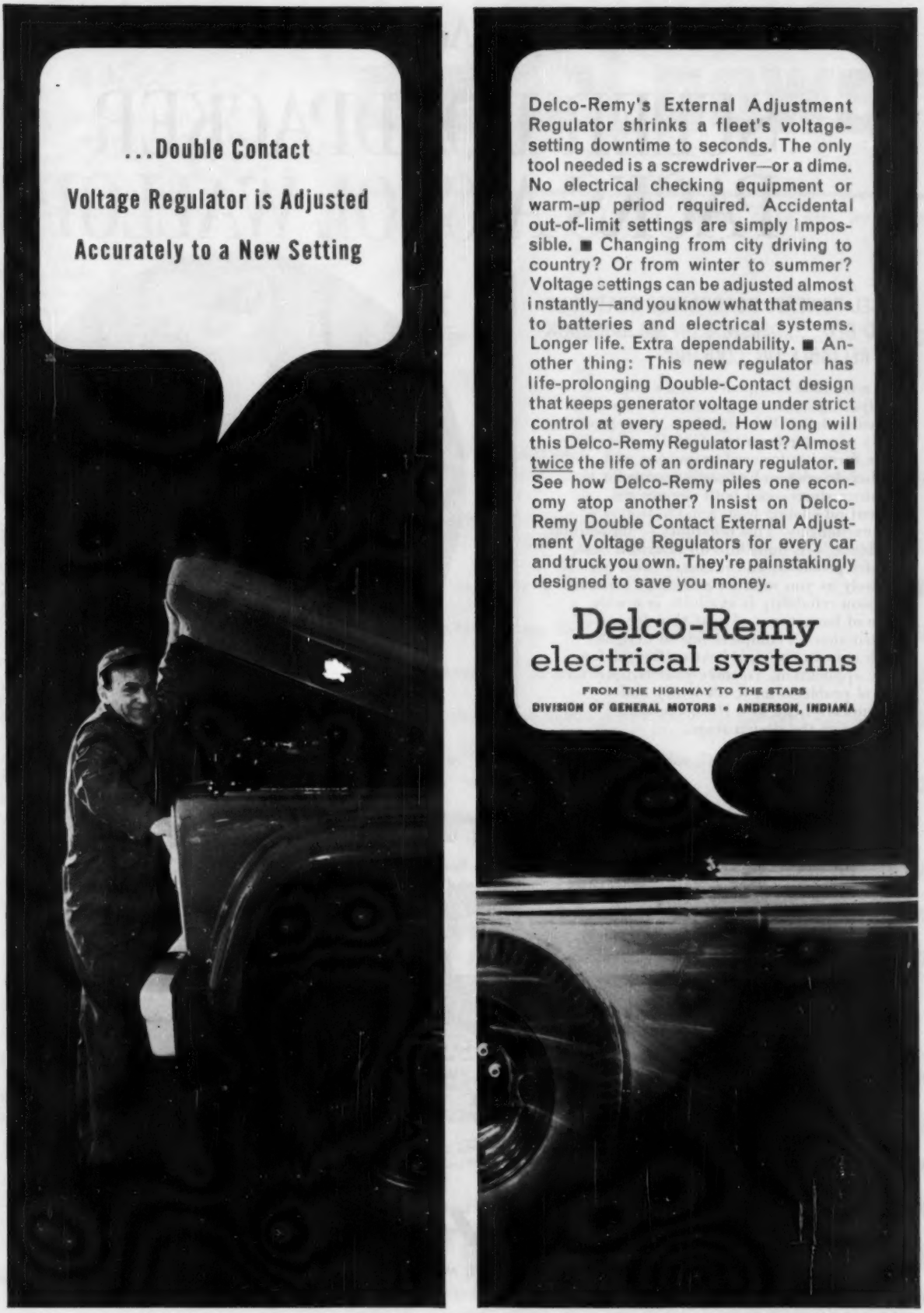
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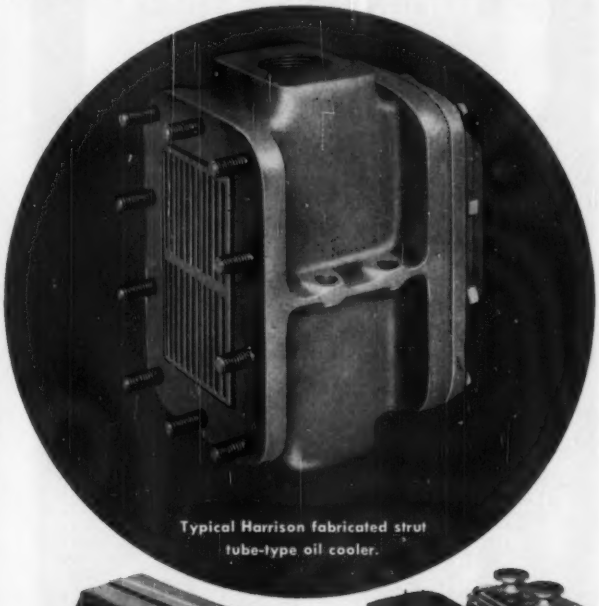

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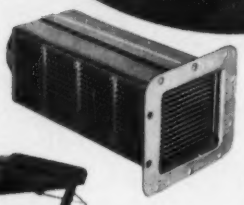

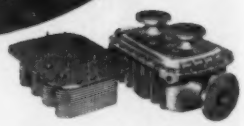

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BPA

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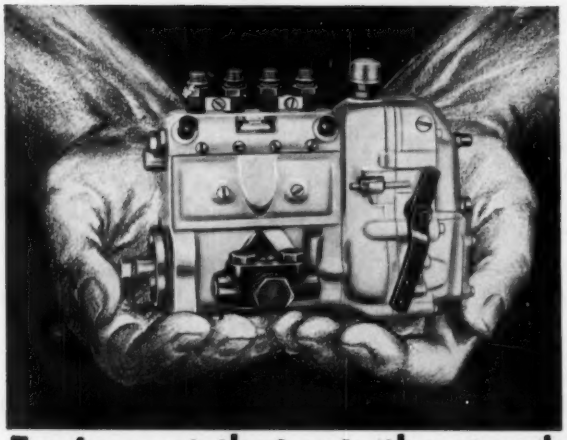

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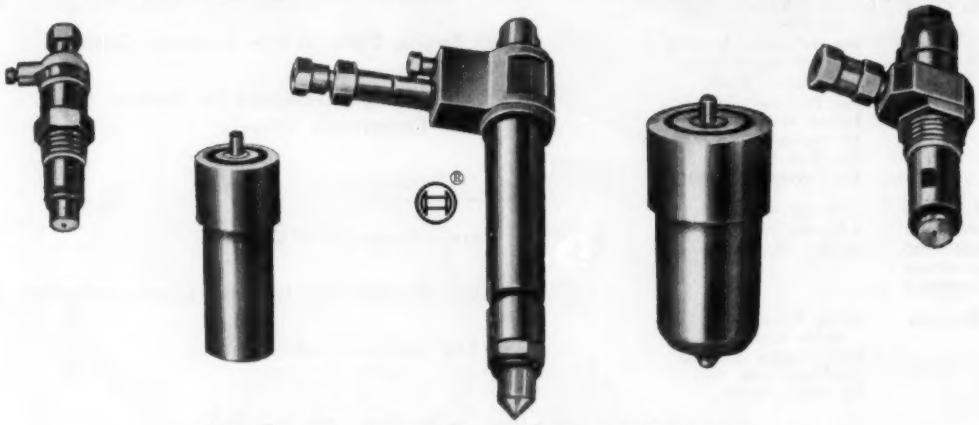

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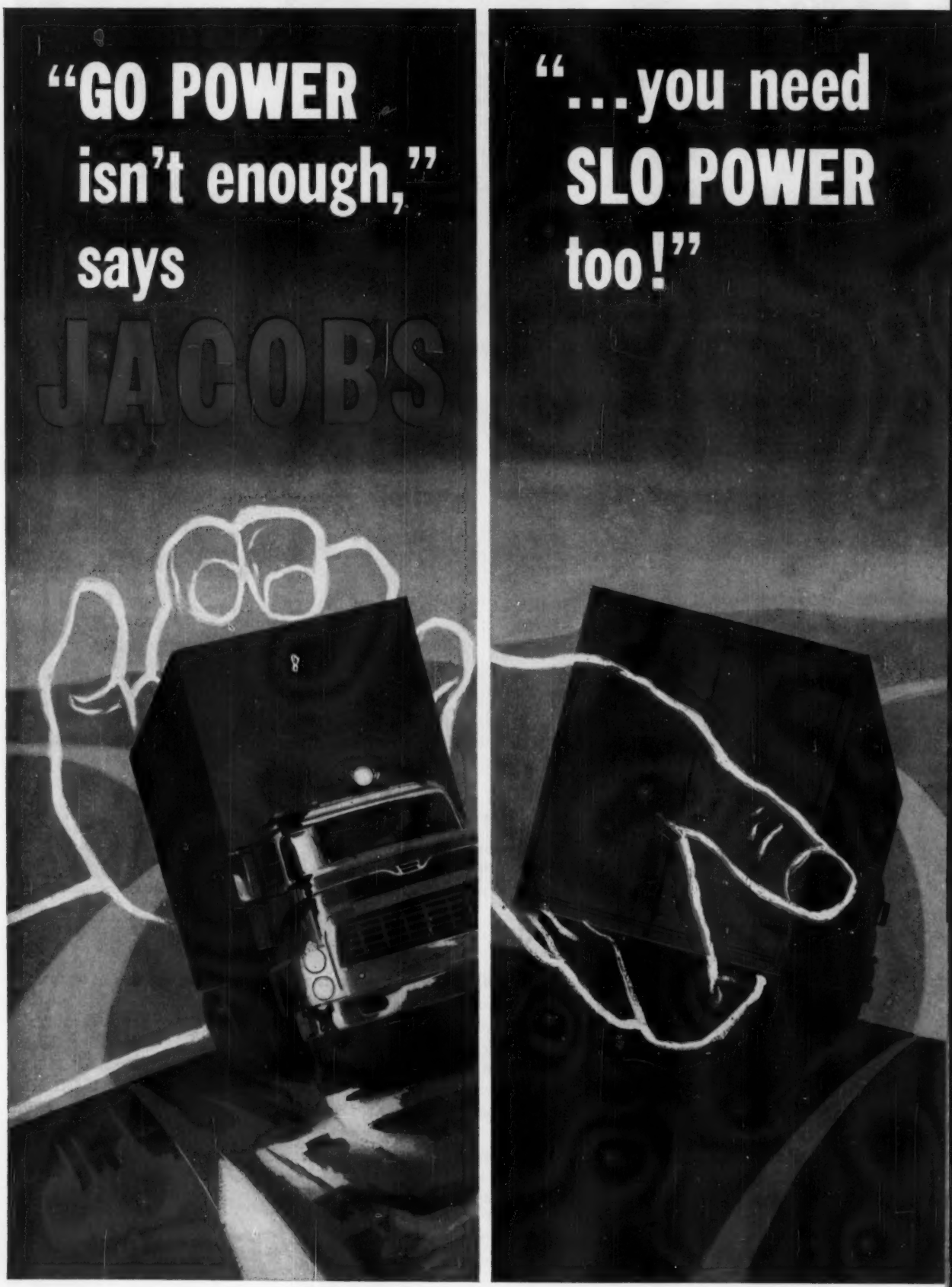
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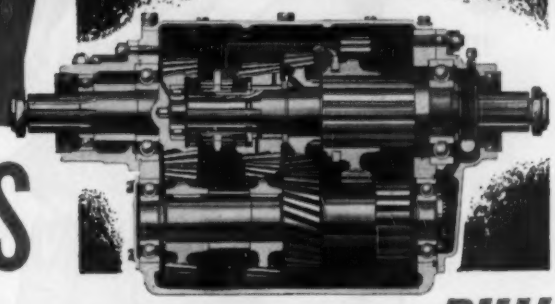

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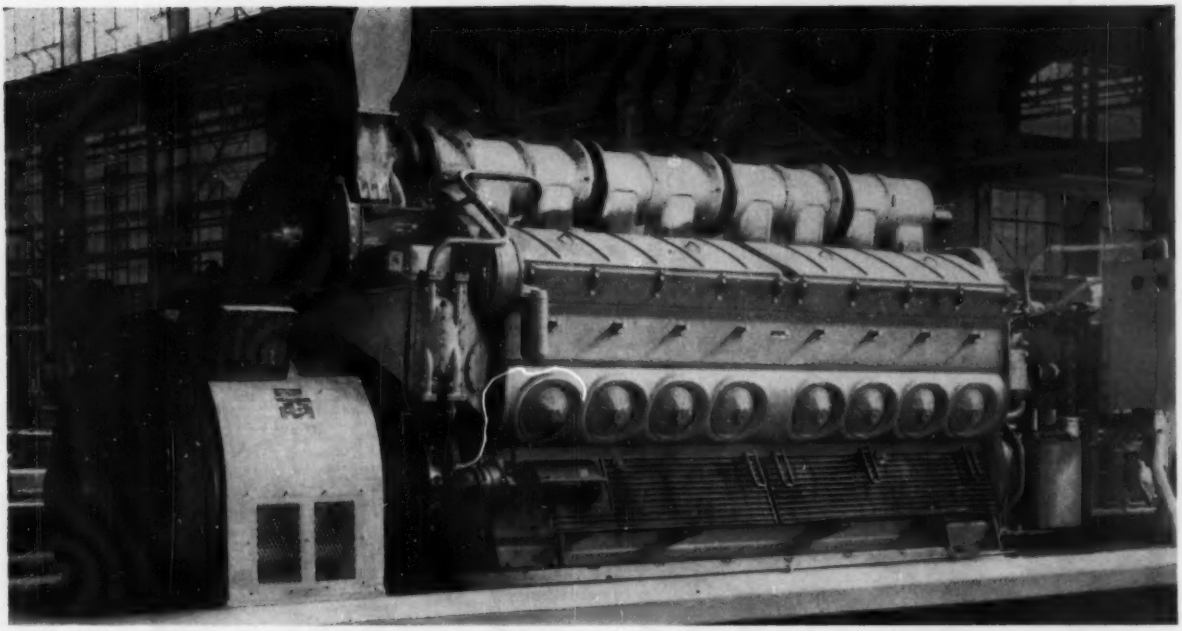
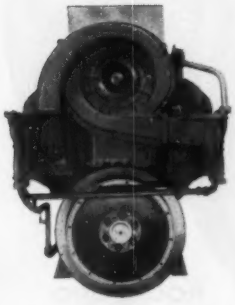


NEW GENERAL MOTORS 16-567D4 TURBO-CHARGED DIESEL ENGINE

The new General Motors 16-567D4 Turbo-charged Diesel engine, shown above with matching generator and accessories, is rated 2880 horsepower for utility peaking and reserve power generation. This same engine is rated 2275 gross continuous horsepower at 900 rpm for industrial and military application.



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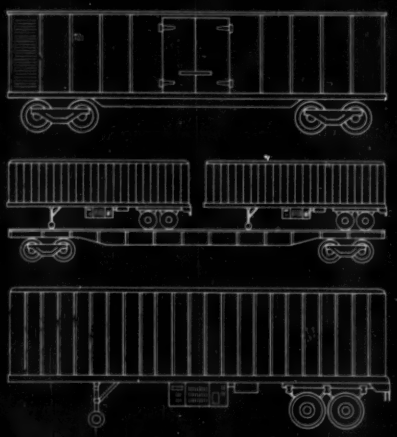

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Extra stamina is demanded of every part of Caterpillar's massive D8 Tractor because it's built to push or pull the heaviest loads over the roughest terrain. This "something extra" is evident in the D8's powerful 235 HP turbocharged diesel engine—complete with packaged piston ring sets by Koppers.

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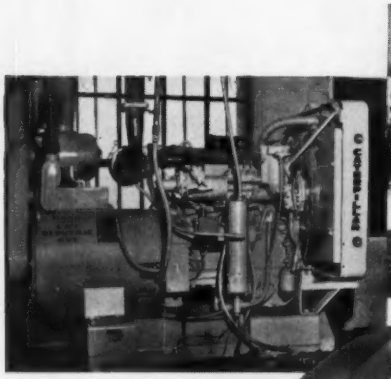
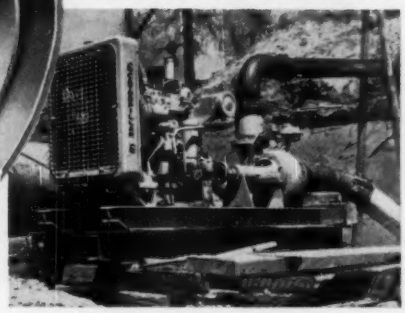


Caterpillar 130 hp D320 turbocharged industrial engine: with generator set supplying all power to 5,000 watt radio station . . . in high speed marine application . . . driving air compressor for mine and quarry operation . . . driving water pump for gravel pit operation



AiResearch T-6 turbocharger (weighs 24 lb, 7¾ in. diameter)

Economical turbocharging of Caterpillar's 130hp D320 engine

Economical turbocharging of Caterpillar's small, versatile D320 engine with AiResearch's T-6 turbocharger results in a highly efficient engine that is lower in original cost, more economical in operation and smaller in size than a naturally aspirated engine of the same horsepower.

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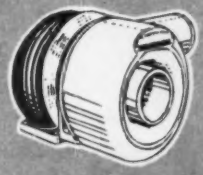
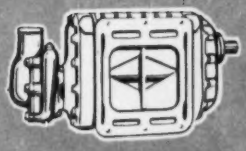
Fans

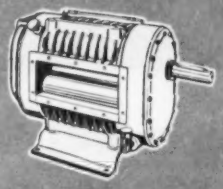
Fan Drives



Turbochargers

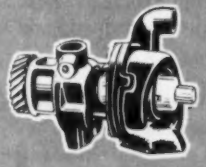


Superchargers



Air Pumps

Dampers



Pumps

Shaft Seals

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with a new approach

INTERNATIONALLY ACCLAIMED

SCHWITZER CORPORATION

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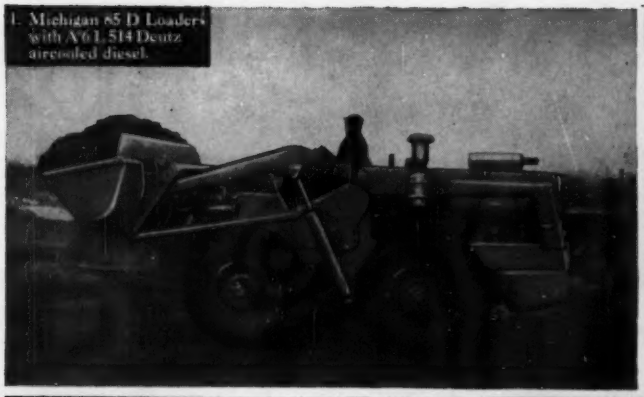
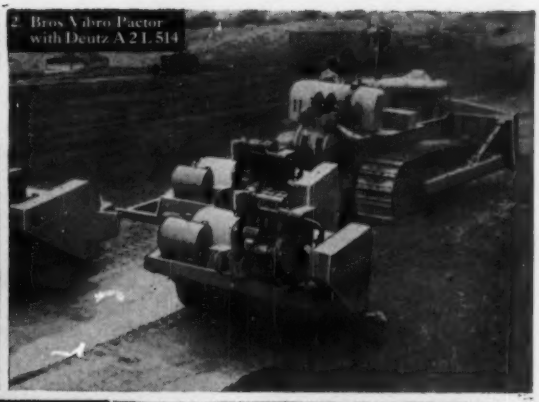
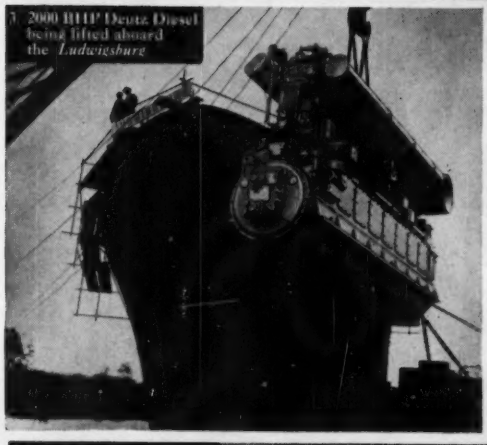


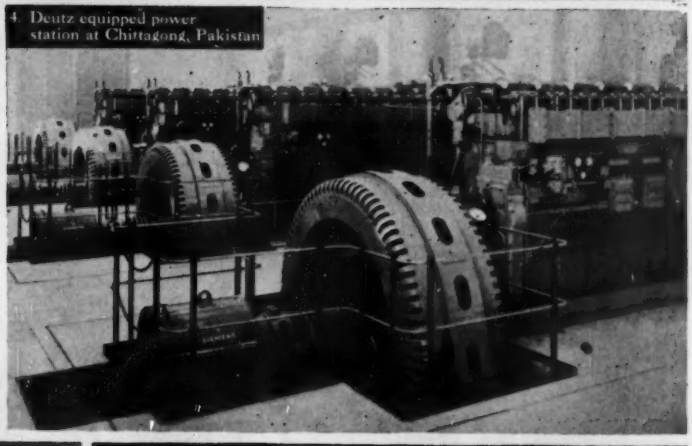
1. Michigan 85 D Loaders with A 6 L 514 Deutz aircooled diesel.



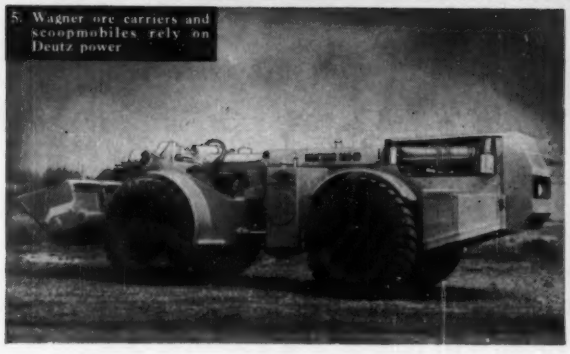
2. Bros Vibro Pactor with Deutz A 2 L 514



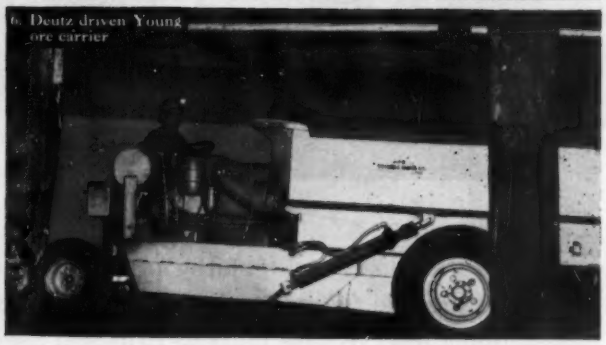
3. 2000 HHP Deutz Diesel being lifted aboard the *Ludwigsburg*



4. Deutz equipped power station at Chittagong, Pakistan



5. Wagner ore carriers and scoopmobiles rely on Deutz power



6. Deutz driven Young ore carrier

Dynamic Deutz Diesels are equally at home in front-end loaders, compactors, marine vessels, power plants, generators or ore carriers. There is a wide range of both air and water-cooled diesels. Unequalled reliability, rugged construction and high economy have been Deutz trademarks for over 90 years. Any diesel application problems? Send coupon!

DEUTZ Diesels

DIESEL ENERGY CORP., 82 Beaver St., N.Y. 5, N.Y.
Please send information on Deutz Diesels for:

☐ Marine ☐ Power Equipment
☐ Mining ☐ Irrigation
☐ Construction ☐ Oil Pipe Line DP

I am a ☐dealer ☐manufacturer ☐operator

Name_____
Title_____
Company_____
Address_____

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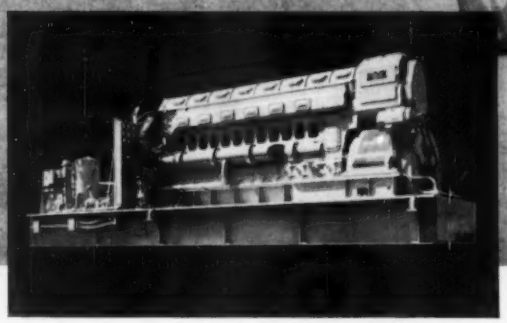
NOW! FULL POWER IS 15 SECONDS FAST!



Solve peak-load and standby problems! F-M's exclusive O-P Diesel Generating Units provide *full* power in 15 short seconds . . . *from a cold start!* They need no spinning reserve. Use no power till you use them! The reason? Our exclusive O-P (Opposed-Piston) design. Two pistons in one cylinder function from a *single* combustion. This minimizes *vibration* . . . produces fine *balance, smooth* power to peak the generator—in just 15 seconds! F-M Opposed-Piston Diesel Generating Units are available with automatic or manual controls. Produce up to 2500 kw per unit. They may be linked in multiple units for peaking, standby duty . . . or dead load pickup! You can't buy better—or more economically.

For full details or custom specifications, write today to: **Mr. S. K. Howard; Diesel Division; Fairbanks, Morse & Co.; Beloit, Wisconsin.**

FAIRBANKS MORSE

A MAJOR INDUSTRIAL COMPONENT OF

FAIRBANKS WHITNEY

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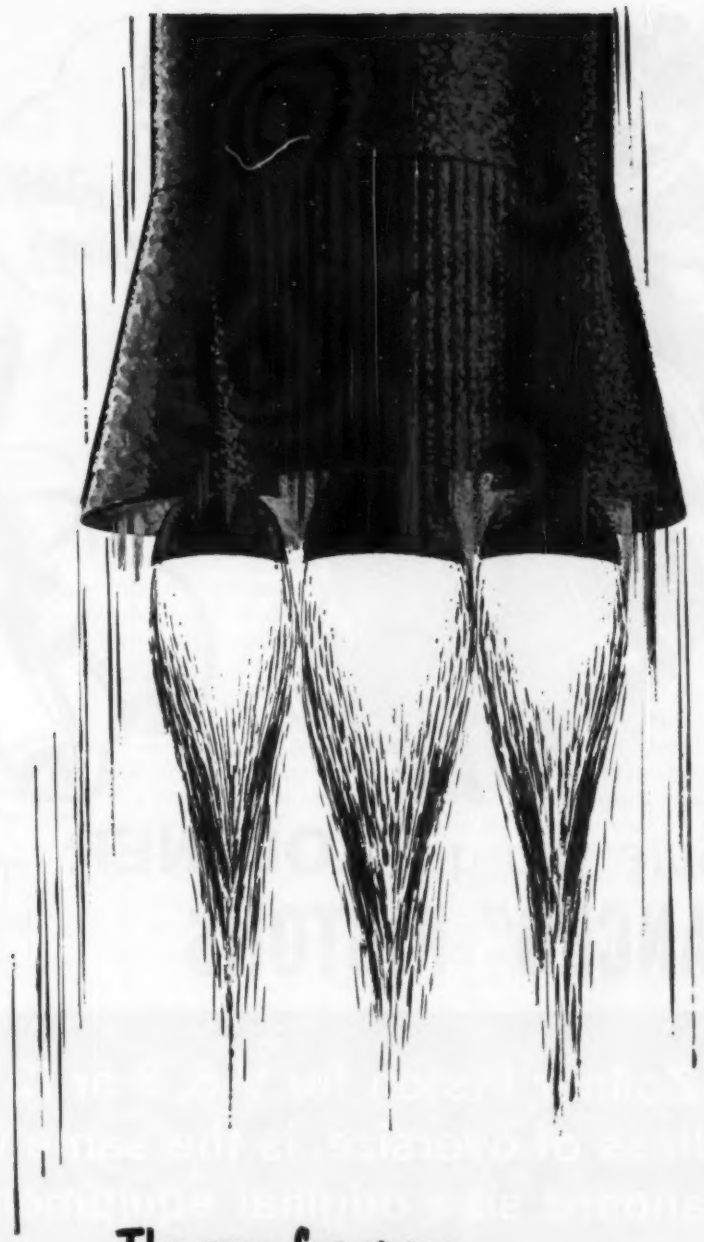

The race for space

...where gaskets must not fail

The sealing of rocket fuel is an important contribution of Flexitallic Gaskets in man's conquest of space.

For this critical sealing application, it takes the Flexitallic Spiral-Wound Gasket construction — using the proper metal, the proper filler, and the proper yield characteristics determined by Flexitallic engineers.

Every Flexitallic Gasket is designed for the specific job it has to do—the sealing of corrosive fluids, temperatures from extreme sub-zero to maximum temperatures compatible with available metals. Pressures ranging to 15,000 lbs. p.s.i., or temperatures to 2500°F. do not impose impossible limitations. The Flexitallic Gasket construction compensates for unusual joint stress embodied in problems of thermal and physical shock.

Give us the facts about your most serious sealing requirements — in chemical processing, petroleum, power, marine, aircraft and missiles, diesel, or any other field. There's a Flexitallic Gasket to meet your needs — or Flexitallic will design one. Write Flexitallic Gasket Company, Camden 2, New Jersey. Stocking distributors for Standard Flexitallic Gaskets in principal cities.

Flexitallic®
SPIRAL-WOUND GASKETS

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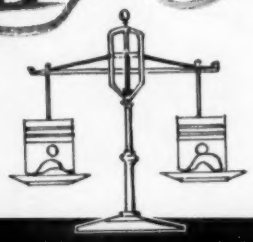
Be Sure you get **ZOLLNER**

"BALANCED" PISTONS



"Every Zollner Piston for V-6, 8 or 12 engine, regardless of oversize, is the same weight as the standard size original equipment piston"

All V-6, 8 or 12 engine pistons must be balanced to the same weight as the standard size original equipment piston to avoid vibration and restore original standards of smoothness and efficiency.

☆ Highest Engine Performance

☆ Lowest Maintenance Cost

PISTONS BY

ZOLLNER

FOR EVERY TYPE INTERNAL COMBUSTION ENGINE — GASOLINE OR DIESEL

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Proposed Truck Taxes — Are They Punitive?

President Kennedy's tax proposals for financing the Highway Program are good for an argument anywhere. Even different categories of diesel users have partisan viewpoints. Construction groups have come out for the proposals; they want the funding to step up roadbuilding. The railroads, well . . . In the heat of controversy some key points seem to have been lost. Point 1—Our economy's welfare depends on our *whole* modern-day transportation system, a complex integration of all forms of transportation of which trucking is one *indivisible* part. Legislation adversely affecting one form of transportation cannot help but affect the system as a whole and eventually our economy. Point 2—"Let the user pay" is a valid concept only if there is an ability to pay. In this regard, ATA reports that for the trucking industry, average net income was off 47.4% in 1960 although gross revenues rose slightly. Operating ratio (expenses to gross) for 1960 was 97.5, up from 95.7 in 1959, due to general cost increases. So there's 2.5% of gross revenue left for interest, income taxes and profits! The tax jolt would make trucking more marginal, unprofitable . . . or force increased rates. Since trucking is essential, the latter alternative is most likely. Yet today's transportation costs are already a burden. Point 3—Why should users alone pick up the tab; why not all who benefit? The Program has been "sold" on the basis of National Defense needs plus its value to the business community and industry. The roads are intended to move people and goods from here to there, more rapidly, more economically and with greater safety. Speaking of goods, trucks are only the instrument by which a service is rendered to shipper and customer. If the trucker benefits from the roads, so do those he serves. And certainly someone benefits from skyrocketing land values along new and improved highways . . . industrial centers that spring up along them . . . the shopping centers and motels . . . Yet truckers are singled out to pay through the nose. Point 4—If the Highway Program has such far-reaching benefits, what's wrong with allocating general funds for roadbuilding? It's a fallacy to think that if the trucker picks up the tab that it stops there. He can't absorb it and still operate profitably so he must pass it on after a lot of hardship in getting rate increases. This adds to product cost so John Q. Public pays the bill anyhow. Let's face facts. We need the roads—now—but no long-range good will come of what amounts to punitive action against one segment of transportation to get them.

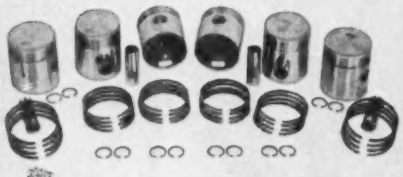
B. P. E.

PROTECT YOUR POWER INVESTMENT...

BUY *genuine* WAUKESHA PARTS

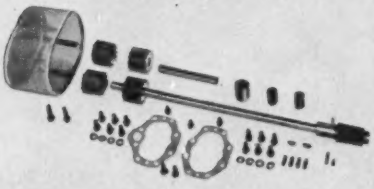
...in the original sealed packages—always obtainable from your Authorized Waukesha Distributor—are your best insurance of continuous satisfaction and economical engine performance.

PISTONS, PINS, RINGS



Matched in sets for weight and balance. Correctly fitted sizes.

OIL PUMP PARTS

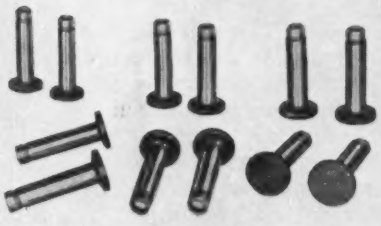


Precision bushings, shaft, gears, clearances. Correct gasket sizes.

MAIN AND ROD BEARINGS

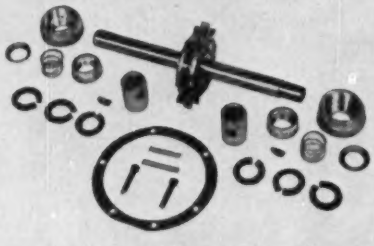
Absolutely clean. Numbers correct. Best materials. Perfectly sized.

VALVE LIFTERS



Factory heat-treated and ground. Accurate metallurgy and dimensions.

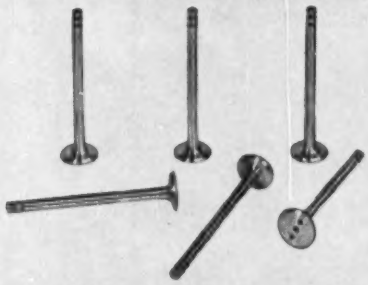
WATER PUMP PARTS



Precision bushings, shaft, seals—accurately balanced impellers.

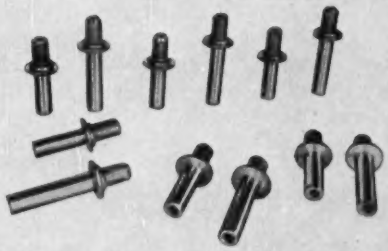
> **"There is hardly anything in the world that someone cannot make a little worse and sell a little cheaper—and the people who consider price alone are this man's lawful prey."**
>
> —*John Ruskin*

INTAKE AND EXHAUST VALVES



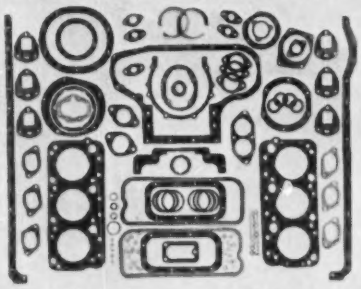
Quality and best materials ensured—no nicks, burrs, hand prints.

VALVE GUIDES



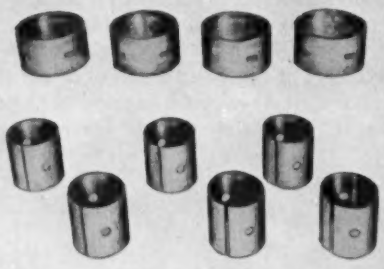
Service sized; inside and out—give just-right valve lubrication.

COMPLETE GASKET SETS



A right gasket for every place on your engine—dimensionally stable.

CAMSHAFT AND PIN BUSHINGS



Pre-sized for service use—no distortion—precise oil metering.

For that extra quick service call your Waukesha Distributor — see alphabetical section, or Yellow Pages in your phone book—you'll have your repair parts in a hurry!

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / **New York • Tulsa • Huntington Park, Calif.**
Factories at Waukesha, Wisconsin and Clinton, Iowa

513

diesel power

highlights

PERCENTAGE-OF DIESELIZATION IS HIGH

U. S. Department of Commerce Current Industrial Report shows that over 50% of the wheel-type tractors produced and shipped in January (except contractors' off-highway type and garden tractors) were powered by diesel engines. In the 45-60-belt horsepower power range, the percentage of diesel over other remaining power sources was nearly three to one.

MANUFACTURERS ARE SPENDING MORE MONEY

U. S. manufacturers spent more on the construction of new plants and renovation of older plants, during the first quarter of '61, than they did for the same period last year. Thinning profit margins are behind the big push, with each working to get a competitive edge by investing in research facilities and technical service labs. Seventy percent of the money spent is destined for expansion and renovation, working toward greater efficiency; thus, higher profit margins.

CONTRACT AWARDS PICTURE LOOKING BRIGHTER

Contract awards for all type of construction seem to be on the up-swing. December 1961 showed a 22% increase over the same month a year ago. Public construction awards are apparently setting the trend, running much better than private-construction awards. Many construction companies are expanding (or getting ready to expand) their engineering staff to handle the early details of new contracts.

PUTTING A TRUCK ON THE ROAD IS EXPENSIVE

According to figures compiled by Pacific Intermountain Express, an average 136 identification devices are required for just one line-haul truck-tractor and semi-trailer combination operating in an 18-state area. All must be in order before the truck rolls. Because of the work and the accuracy required, this is an expensive project. Again, according to P.I.E., annual highway user and property taxes for an average complete line-haul tractor-trailer unit exceed $4000.

ADDITIONAL NATURAL GAS SERVICE TO FLORIDA

A recent FPC decision authorizes Houston-Texas to increase its facilities to bring 93 million more cubic feet of gas through pipeline into Florida. The construction involves some 30,000 additional compressor horsepower.

WHITE MOTOR'S SALES HOLDING STEADY

The Diesel Engine Division of White Motor Co. is doing "better than any of our other divisions on a comparison basis", according to J. N. Bauman, company president. Profit for '61 is topping that of '60 on about equal sales.

ONE MILLION IN TWO YEARS

Production of General Motors Series 53 diesel engines, introduced in 1959, reached the one million cumulative horsepower mark last January. 24-195-hp engine range was designed to meet power requirements of light and medium-duty trucks, light industrial and construction equipment, work boats and small pleasure craft. January sales also boosted overall output of all GM diesels to over 88 million horsepower, going back to 1938.

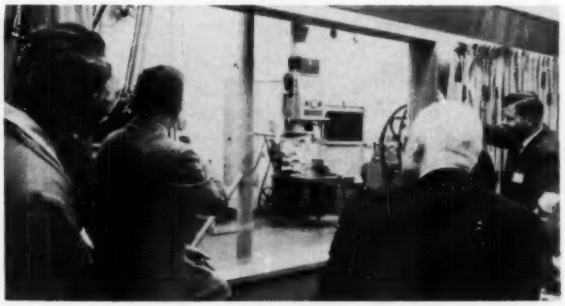
diesel power

news section

In Case of Emergency
Included in the contract to add a new wing to New Britain (Connecticut) Memorial Hospital was provision for a standby generator set. A Caterpillar D337 Diesel Electric set was chosen, and was purchased from H. O. Penn. The Hospital now boast 100% electrical coverage. Operation is automatic.

Million Miler
North Western Railway diesel locomotive No. 2012 has become Pakistan's first "Million Miler". It achieved this record eight years after its delivery to Pakistan by Alco Products. In honor of the record, locomotive's new name is "First Millionaire", printed across front of 2012.

Complete Engine-Generator Facility
Darr Equipment Co. of Dallas is offering a complete sales, engineering, testing and service facility for diesel engine-generator packages up to and including 400-kw 240/480-v units. An independent company, Darr has installed testing equipment in their Dallas plant that will test any make generator package of this power class or below under full load. Recording meters provide positive checks of frequency and voltage modulation, regulation, etc.



ADS Visits Southwest Research Institute
Program of the Association of Diesel Specialists meeting, recently held in San Antonio, included a visit to Southwest Research Institute. While emphasis was placed on seeing SRI's work in the area of engines, fuels and lubricants, ADS members also saw their facilities for radioactive research. Beyond far wall are heavily-shielded cells. Through shielded window (black) researchers can see to handle "HOT" materials with manipulators.

I-H Awards

Howard Ward and Ben Carey, both of Nashville, have been awarded Master Technician certificates by Melrose Technical Institute, service training center of I-H's Construction Equipment Division. This award is the highest offered by the institute. Both Ward and Carey are with Power Equipment Co., in Nashville.

For Closer Co-Op

Garrett Corp.'s AiResearch Industrial Division has instituted an informal working relationship between project engineer and machinist. Devoted exclusively to development work, the machine shop is equipped to do virtually anything on experimental or test hardware for turbos. The system has showed substantial improvements in time and costs. Changes can be made verbally, without duplicating prints, etc. The project engineer stays with the hardware through the development assembly area, inspection and testing.

California Trucking Assoc. Sponsors Show in 'Frisco

International Truck, Trailer and Equipment Show will be held in San Francisco June 28-30, 1961—first of its kind for Northern California. Brooks Exhibit Hall, site of the show, is ideally located near the Civic Center with lots of parking near-by. There are 90,000 sq ft of available show space in a specially designed auditorium.

Foreign manufacturers will join domestic makers in a display of all types of equipment and services pertaining to highway transportation.

For the first time, manufacturers and distributors will be offered opportunity to show and personally sell both the for-hire trucking industry leaders and the fleet owners. Show committee is made up of 29 Presidents of western companies which collectively purchase more than $100-million in equipment annually. Meetings and forums have been planned during the show which will also feature an intriguing look at tomorrow's highway transportation.

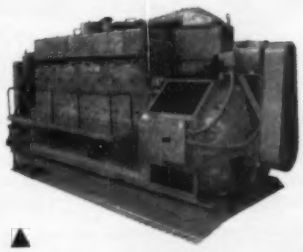
Atlas Missile as it clears the pad.

Engine exhaust heat, recovered by Vapor Phase® Waste Heat Recovery Silencers on White Diesels, is utilized in the latest design of ICBM sites. Cost of operation is reduced substantially by using this energy in various ways to supplement generated power.

In other applications, engine heat from jacket water and exhaust is recovered for space heating, product heating and with absorption refrigeration for air conditioning.

In addition to these advantages, Vapor Phase systems permit the use of cheaper fuel. Engine wear is reduced and you can lengthen the time between overhauls.

Wherever engines are used, Vapor Phase® can improve efficiency and add economy.



White Superior Engine-Generator Model 40-SX-80 used at Atlas Missile Bases.

Vapor Phase Exhaust Waste Heat Recovery Silencer designed for use with the Superior Engine-Generators used by the Air Force at Missile sites.

6013

E C VAPOR PHASE

Sole, developers and manufacturers of Vapor Phase Thermal Circulation (Ebullition) Engine Cooling Systems.

ENGINEERING CONTROLS, INC.

611 E. Marceau • St. Louis 11, Mo.

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KATO A.C. GENERATORS

KNOWN FOR LONG, DEPENDABLE SERVICE!

- CUSTOM ENGINEERED to your exact requirements.
- NOW 500 WATTS TO 1,000 KVA
- ADAPTABLE TO ANY INDUSTRIAL ENGINE

With new rugged E-157 FRAME the Kato Generator line has been extended to 1,000 KVA. Each is built with the same careful craftsmanship and top quality materials for which KATO has been known since 1928.

UNIFORM QUALITY is achieved by constant, thorough supervisory checks throughout production.

LONG LIFE is assured because Kato Generator design and capacity allow for characteristics beyond normal requirements.

ALSO KATO MOTOR GENERATOR SETS, HIGH FREQUENCY GENERATORS, D.C. GENERATORS, ROTARY CONVERTERS, POWER CONVERTING SYSTEMS.

CSA APPROVED

NEW! E-157 FRAME complete with all controls, couplings for the engine of your choice.

Builders of Fine Rotating Electrical Machinery Since 1928!

Write or phone concerning your specific requirements!

KATO ENGINEERING COMPANY

1408 FIRST AVENUE, MANKATO, MINNESOTA—Phone 8-2941

For more information write in No. 98

A DIESEL FILTRATION CATALOG AND DATA SHEETS COVERING OVER THIRTY YEARS IN THE FIELD . . . . . YOURS AT NO COST

In these days when every maintenance hour counts, it is particularly important to know how and where sound economics can be made. In these pages you will see how to cut the high cost of excessive down-time.

Water and dirt damage can be controlled. Know why more than 99% of these two costly offenders can be eliminated from your maintenance schedules.

Briggs — PIONEERS IN MODERN OIL FILTRATION

DIESEL FUEL AND LUBE OIL FILTERS

FILTER/SEPARATORS

FILTERS, FILTER-SEPARATORS AND CARTRIDGES FOR WATER AND DIRT REMOVAL FOR USE ON EVERY SIZE AND TYPE DIESEL

MAIL THE COUPON
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THE BRIGGS FILTRATION COMPANY, DEPT. 373
WASHINGTON 16, D. C.

Please send catalog and diesel data pages

Name .....

Address .....

Company .....

For more information write in No. 99

NEWS SECTION . . .

It Takes a Lot of Power . . .

Growing student population at Principia College, Elsah, Illinois, prompted the addition of a new 150-kw generator set to keep pace with power demands. A 6-110 engine manufactured by Detroit Diesel Engine Division of General Motors drives the generator which takes up less space than either of the 100-kw sets already in use.

Output of the new unit along with the other two meet the emergency requirements of the entire 500-student campus, with more in reserve for continued expansion of the facilities.

New unit can take over the entire lighting system as well as provide power for the operation of all heating equipment and elevators . . . if there's an emergency main-line shutdown. The set, supplied by Western Diesel Engine Co., delivers full power in seconds without time-consuming engine adjustments and warm-ups. Installation was reportedly simple and economical.

Detroit Diesel's Overhauls Certified

It's in writing! Distributors and dealers of the Detroit Diesel Division of General Motors now offer written assurance that all overhauls they perform conform to the same high standards.

Diesel engine owners need have no doubts regarding the efficiency of their overhauled engines. The new service certificates indicate results of all engine tests. Two forms are completed and delivered to the customer upon completion of the job.

The "Engine Test Report" indicates all pre-start and run-in checks made, the duration of basic run-in periods at various engine speeds and loads, just what the required adjustments were following the tests, and the engine characteristics as revealed by final dynamometer tests. The "Dynamometer Test Certificate" is the confirmation of the overhaul, tests and inspections made, dates, serial number, etc. An important file item.

New Officers for ADS

According to the ADS spokesmen, the San Antonio meeting was a "howling" success. Speakers kept members informed of latest developments in the field, and there was plenty of time for informal shop talk. Included among new business was election of new officers, Henry B. Sirotek, past president is shown with newly elected officers. Left to right, W. J. Connell, V-P; Stan Franklin, President; Mr. Sirotek; Jim D'Aversa, treasurer; and George Hull, Secretary. A watch was presented to Henry Sirotek by Andy Perkins, retired member of the Board of Directors.

Ford Sub-division

Ford is separating its industrial equipment from its agricultural. Color Coding will identify the divisions' products. Industrial equipment will be industrial red and brilliant buff.

Grading Begins

Earthmoving of gigantic proportions is now underway at Stapleton Airpost in Denver, preparatory to building a 11,500-ft concrete runway. Within a 400-day period, Northwestern Engineering Co. will move 4,123,000-yds of dirt. By the end of the first week, six I-H TD-25 crawlers, four model 495 payscrapers and three model 295 payscraper rigs had dug a 2000-ft drainage trench, stripped the frozen topsoil, and initiated debris removal.

Harbormaster Marine Tractor

TOUGH POWER and STEERING JOBS ARE EASY FOR THIS WORK HORSE!

Solve tough power and steering requirements with Harbormaster Marine Tractors. Harbormasters are complete, heavy duty outboard propulsion and steering units, *all in one quickly and easily installed package.* They are efficient and economical to operate and they offer many special features not found with ordinary marine power.

If you want easily installed power, better steering control, safety in shallow water, easier maintenance, more efficient performance, simpler hull design, more cargo space, or simplified crew operation . . . then it will be worth your while to investigate Harbormaster Marine Tractors.

From 40 to 500 hp, gas or Diesel. 40-50 hp model shown.

- *steer in any direction with full power*
- *easy service and low operating costs*
- *protection in shallow water*
- *rugged, trouble-free performance*

Send for Harbormaster Catalog. It contains detailed information and many photographs of Harbormasters in action.

MURRAY & TREGURTHA, INC.
high fidelity marine equipment since 1885
QUINCY, MASSACHUSETTS

MURRAY & TREGURTHA, INC.
74 Hancock St., Quincy 71, Mass.

Please send me New Catalog giving details and showing many photos of Harbormasters in action.

Name.....

Company.....

Address.....

.....

For more information write in No. 100

Operates on Crude

"Desert Star #3", just delivered to Camdrill International by Ideco (Beaumont, Texas), is starting mobile operations in the Zelten Lease in North Africa. Unit is designed to operate under severe conditions far from supply sources. Six Caterpillar diesels, engineered to burn a wide variety of crude, power the operation. Special filters protect against extreme dust and dirty fuel. Four trailers carry all the equipment, ride on Goodyear desert tires.

No Doubt About It . . . Education Pays Off!

Increased profits, fewer accidents, better driver morale, lower insurance costs, prolonged vehicle life, faster deliveries, better public and customer relations . . . just a few of the reasons for Motor Fleet Supervisor Training. The National Committee for Motor Fleet Supervisor Training has found that education is needed so vitally, that neglect by a firm will undoubtedly result in more costs and less profits.

Present program has as its major function establishment of in service training courses. 21 national organizations are cooperating with 50 of the nation's leading colleges, with the Institute of Public Safety at Penn State University as headquarters. Program is constantly under surveillance by 125 leading specialists in motor transportation and insurance. Courses are in: Motor Fleet Supervision, Maintenance for Safe and Efficient Operation, Effective Fleet Operation, Top Management, etc.

New Units

Three diesel-electric rapid delivery units, were turned out recently by A. G. Schoonmaker. One unit, a 1375-kva was delivered to the city of St. Cloud, Florida, one week after placement of the order.

"Traffic" Problem

Fairbanks, Morse's delivery of a big engine to the city of Thibodaux, Louisiana, required an eight axle car to handle the weight. Lightened (!) by 30-ton, it still weighed in at 108-ton. Big engine was shipped at a maximum speed of 35-mph from F-M's Beloit plant. Required clearances of very close to 18-ft above the rails.

Continental Motors Office Opened In Inglewood, Calif.

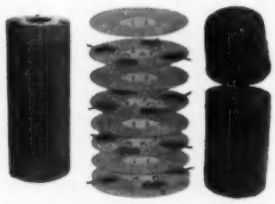
To furnish engineering assistance to prospective users of **Continental** engines and follow up in the field after the sale in that area, a new office has been opened in Inglewood, California. With the steadily-growing use of power equipment in the West, Continental can now support its manufacturing customers in that region as well as through its resident representatives in the San Francisco and Portland, Oregon areas.

HILCO® FULL FLOW FILTERS

FOR MAXIMUM FILTRATION OF DIESEL AND GAS ENGINE LUBRICATING OIL, FUEL OIL AND GAS FUEL···

with these features:

- High flow rates
- Low pressure drop
- Choice of filter cartridges
- Large dirt storage area
- All steel welded construction
- In-out pressure gauges
- Quick action cover lifter
- 100 psi standard design pressure
  Higher pressures upon specification
- Swing bolt cover construction



HILCO FILTER CARTRIDGE TYPE FW-718 COMBINATION EXTENDED SURFACE AND DEPTH MICRO FILTRATION

HILCO FILTER CARTRIDGE TYPE PL-718 EXTENDED SURFACE FOR EXTREMELY HIGH FLOW RATES

"F" Series HILCO HYFLOW OIL FILTER

HILCO FULL FLOW FILTERS Available in capacities up to 2000 GPM and Micro Filtration at that . . . Removing Particles 5 Microns and Smaller

• Write to the PIONEERS of Micro Full-Flow FILTRATION

THE HILLIARD CORPORATION
120 WEST FOURTH STREET
ELMIRA, NEW YORK

For more information write in No. 101

New Cat Dealer

Zagst, inc., of Houston, has been named a dealer by Caterpillar.

Allis-Chalmers

Construction Machinery & Supply Co. of Wausau (Michigan) has been appointed to handle sales, parts and service of construction and logging equipment for Allis-Chalmers.

Lights On in Greenland!

Electrification of the towns in Greenland has been completed after ten years. Annual production is now set at 15-million kw hours.

Continuing modernization and industrialization in Greenland will mean even further extension of electricity.

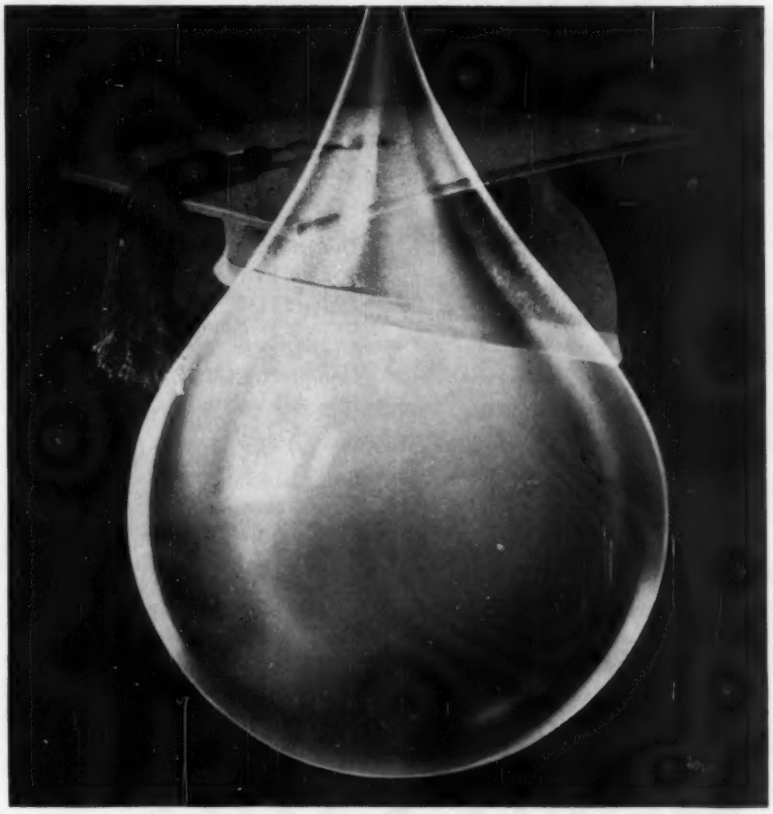
Already 81 Burmeister & Wain diesel engines have been supplied, about 23,000 bhp. 17 electricity works have been built in Greenland towns. Latest installations are in Nanortalik, West Greenland. B&W engines have also been supplied to the new Loran station in East Greenland to aid shipping and air traffic in determining positions. 14 B&W engines supply power for the two large radar stations built by Danish engineers for American use.

Maintenance Superintendents Form Group

The Construction Equipment Maintenance Association of New England has recently been formed. Like others all over the country equipment superintendents in the area felt the need for a forum where they could exchange ideas, learn from the experience of others and get to know each other better. You are eligible to join if you are concerned exclusively with maintenance problems of construction equipment. The group now has members who are equipment superintendents, master mechanics and equipment dealer service managers.

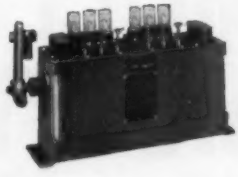
Monthly meetings are held at which meaty subjects are covered, often by specialists including factory service representatives. You can get details by writing to A. L. Morris, CEMA, P. O. Box 94, Needham Heights 94, Mass.

HOW TO educate



a drop of oil!

Just put it through a Manzel force-feed lubricator and any oil drop knows where it's going and how to get there fast. Manzel lubricators deliver just the right amount of oil to bearings, cylinders and packings. They start, stop, speed up and slow down in perfect synchronization with your machinery...unaffected by high steam, gas or air pressure. Whatever your field, there's a Manzel lubricator to meet your needs. For our catalog, write Manzel, 252 Babcock Street, Buffalo 10, New York. Whatever your lubricating problem, you get the right answer if you



ask the man from

UNIT OF HOUDAILLE INDUSTRIES, INC.

Manzel

SPECIALISTS IN LUBRICATORS AND METERING PUMPS SINCE 1898

For more information write in No. 102

diesel power

news—people & plants

Jack Greenberg

New Engineer

Consolidated Diesel Electric Corp. has created the new post assistant chief engineer. To fill the post, **Jack Greenberg** has been promoted from project engineer. Duties include overseeing engineering activity on production projects.

Deutz Distributors Named

Two new distributors for **Deutz** Diesel engines have been named by the **Diesel Energy Corporation.** For New Mexico, **Central New Mexico Equipment** Co., 3712 Edith Blvd., NE, Albuquerque, N. M., **John A. Garcia.**

For Nebraska, **Industrial-Irrigation Services,** 818 West Third Street, Hastings, Nebraska, **Charles C. Osborne.**

In other appointments, **Ernest E. Hammer** was made Western Regional Manager, covering California. He will intensify customer and dealer contacts in that area, and **Ralph Leino,** was named Sales and Service Representative for the Great Lakes area.

F-M Names

John W. Chandler has been appointed assistant manager, diesel sales, Beloit Division, **Fairbanks, Morse & Co.** Formerly, he was assistant for sales planning to the vice-president, at the executive offices in Chicago.

R. J. Graham

Cooper-Bessemer Sales Engineer

R. J. Graham has been promoted to sales engineer in the Mount Vernon branch sales office of the East-Central sales district of **Cooper-Bessemer.** Mr. Graham has been with C-B since 1958, as a sales engineer trainee.

MULTI·STOP
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MILESTONE IN DIESEL PERFORMANCE

An outstanding feature of ISUZU Diesel trucks is the multi-stop driving capacity which has boosted the international reputation of ISUZU Motors. Engineering perfection for multi-stop driving has assured the continuing reliability, durility and performance of ISUZU Diesel engines. Japan's oldest and largest Diesel manufacturer is the ISUZU Motor Co., Ltd.

MAIN PRODUCTS:

Buses . . . . . capacity 12 to 81 persons
Trucks . . . . . capacity 2 to 8 tons
Dump trucks . . (4×2, 4×4, 6×6)
capacity 1.75 to 7 tons

Various other special purpose vehicles, such as fire engines, tank lorries, garbage trucks, etc. Diesel engines (52 to 230 HP) for mounting on marine boats, generators and industrial equipments.

ISUZU MOTOR CO. LTD.

For further information write to:
Export dep't. (DP-2)
Shinagawa-ku, Tokyo, Japan
Cable: "ISUZU TOKYO"

ISUZU Motor Representatives
649 South Olive Street Los Angeles 14, Calif.

For more information write in No. 103

KIENE® hydraulic test pump

new revolutionary design . . . made expressly for field service

CORROSION-PROOF MECHANISM.
LIGHT WEIGHT ALUMINUM CASE.
HEAVY DUTY HYDRAULIC GAUGE—
EASILY INTERCHANGEABLE—
SWIVELS 360° ON TWO PLANES.
LARGE FUEL CAPACITY—MICRONIC PRECISION FILTERS—KIENE PATENTED DIAPHRAM TYPE VALVES.
FLEXIBLE AND RIGID PUMP CONNECTIONS

No Bolts — No Clamps

Kiene Portable Hydraulic Test Pump is an entirely new and different product for the Diesel Industry — with features never before available in the field of injection and hydraulic repair and servicing tools. It offers all operating advantages of existing pumps and introduces many new features. No bolts or clamps required for leverage—to operate you simply use squeezing action on hand lever.

Write for Descriptive Bulletin KTP-50

CONNECTOR SET KIT

makes convenient connection of test pump to most popular makes and models of diesel engines. Fixtures for testing Cummins and General Motors engines available.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

For more information write in No. 104

Mack Names Three Distributors

Mack Trucks has appointed three new distributors in Illinois, Indiana and Massachusetts. They are, respectively: Dean Powers Mack of Rockford (Rockford); Ray Meek Garage (Fort Wayne) and Mack Truck Sales of Springfield (Springfield).

Fulton-Sylphon Appoints Five

Robertshaw-Fulton's Fulton Sylphon Div. has appointed **John P. Balke** district sales manager, headquarters in St. Louis. Appointed as sales managers are **Mack K. Jacobs** (Houston); **John C. Dwyer** (Baltimore); **Thomas J. Fisher** (Knoxville); and **J. C. Cate** (Knoxville).

French Subsidiary

Burgess-Manning International S.A., a subsidiary of Burgess-Manning Co., has been formed. It will service France and the western European countries from its Paris headquarters. Director of the company is **Jean B. Dumon.** For over two years, the parent company has been establishing a distribution organization in western Europe.

American Bosch Names Service & Training Mgr.

Chet Hirsch has been appointed manager, service and training, for the commercial sales division of **American Bosch Arma Corp.** Chet now has supervision over all service and application activities, and directs the division's training program.

Chet Hirsch

Delco-Remy starts Engineering & Research Center

Work is being started on a new engineering and research center close to the division's plant 11, in Anderson, Indiana. Center will be devoted to work on electrical systems and batteries for cars, trucks, buses, light aircraft, farm tractors, marine, off-highway and stationary engine application.

New Rep

Spray Products Corp., best known for its spray starting fluid, has appointed the **J. Paul Saunders Co.** of Bowling Green, Kentucky, as their reps for Kentucky, Tennessee, Mississippi and Alabama. Three sales reps personnel will cover the area.

In Memorium

Robert Cantele White died in a bus accident near Woodbury, Tenn. on February 3, 1961. For the past five years, Mr. White had been Vice-President in charge of Sales with **Cerlist Diesel, Inc.**

Ironically, Mr. White had planned to drive himself from Charlotte to Tennessee, but decided to take the bus instead, as the weather grew bad. A gust of wind overturned the bus at the crest of an icy hill.

Today's Diesel Man

Today's diesel man is an executive . . .

"As our Fleet Maintenance Superintendent, Dudley Adamson is left on his own. He makes the decisions on all maintenance procedures and solves the many problems which arise in this complex field. For the past 23 years, he has kept our fleet rolling, and the responsibility for efficient maintenance at the minimum cost is up to him."

Edward A. Tully, *President*
Tully & DiNapoli, Inc.

Today's dieselman is first an executive. When first entering Dudley Adamson's office, the complexity of his job is obvious. Sitting behind a neat but obviously busyman's desk, Dudley Adamson is faced by a multi-line telephone that rings an average of 20 times an hour. Behind him is a two-way radio that never seems to stop. Each time the phone rings or the radio calls his signal, chances are it's a "crisis".

For example, early in the interview a radio call came in. "Do you have a flat-bed available to move a crane from Idlewild to the Bronx? We're finished with it here, and they need it."

"Yes. We've got one. When do you need it?"

"Right now."

End of crisis. This was an easy one; sometimes they're tough, and require a wealth of background for solution.

Getting Started . . .

Neither Dudley Adamson nor Tully & DiNapoli are newcomers in this respect. The firm was incorporated in 1924, but had been in construction even prior to the incorporation. In 1938, Dudley joined the corporation.

"Along with taking me on, Tully & DiNapoli started to pull out their gasoline engines and install diesels. It made an impression on me. I realized that if I wanted a job here, I'd better learn about those engines. I used to go into the shop on Sundays, with a mechanic, to find out what it was all about. From that first day on, I went through the growing pains of the diesel right along with the engine manufacturers."

Up until a few years ago, Dudley was maintenance superintendent for the entire T & D fleet, automotive and field equipment. But as the fleet grew and grew, maintenance control became more and more difficult. In order to lighten the work load, it was decided to divide the fleet into sections. The field equipment section became a separate maintenance entity, while Dudley kept the automotive section.

Equipment involved . . .

The automotive diesel fleet is 100% Mack. It consists of 24 dumpers, four trailer tractors, eight compressor trucks, two tanker trucks, three water tank trucks and one boom truck. Plus this, there are 42 gasoline-engined pickups.

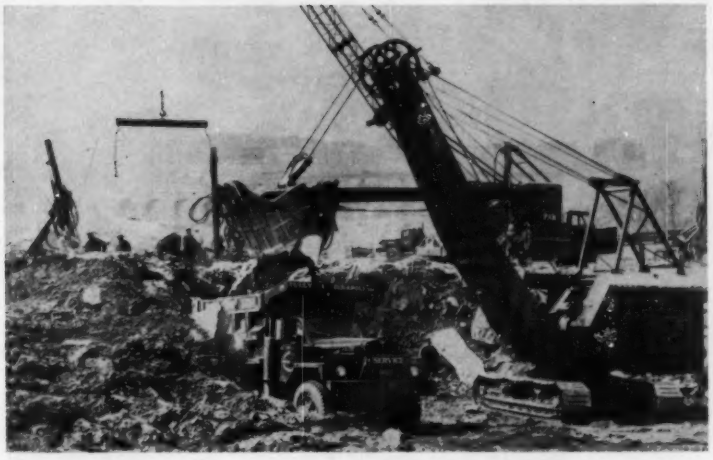
The four tractors are used to haul field equipment to and from job sites. Water tankers are spray rigs to control dust on dusty jobs and aid in getting proper compaction. Tankers are compartmentalized to hold 920-gal diesel fuel, 640-gal gasoline, 350-gal lube oil in three viscosities, 50-gal hydraulic oil and 50-gal water. These tankers go out every day to service the field equipment. Boom truck is, of course, the trouble getter-outer.

Keeping them running . . .

Breakdowns at T & D are rare, at least with the diesel-powered equipment, and then they are minor. They claim to have less down time than any other contractor in New York City. Service garage is usually empty during the day, since everything is out on the job. The pickups are something else. Later in our visit, one dumper came in with a flat tire. Then, a voice came over the radio, and a pickup was on its way in with no brakes.

"I'd sooner have 100 dumpers than those 42 pickups. They're scattered all over the map and everybody drives them. This one is coming in for brakes, but chances are when we look it over we'll find half a dozen other things wrong. They can't be controlled. Only time I see them is when they break down."

It's a different story with the diesels. Over the years,



When jobs start to roll, equipment keeps going. Every piece, automotive and field equipment both, are coordinated into a smooth operation. Dudley Adamson's automotive fleet of Macks works under rough, tough, dusty conditions where only good PM keeps them going.

Dudley Adamson has worked out a minimum-cost maintenance program that gets the most out of every piece of equipment.

"We expect—and get—100,000 to 150,000 speedometer miles before we pull an engine for repair. Here, for example, (picking up a folder), is a Mack dumper with 103,701 miles, as of February. The cylinder head's never been off. The whole list is the same, and they're all in the 100,000-mile bracket.

"The secret is cleanliness. Keep the engine clean. Our equipment works in dust you can't even see through, and cleanliness on our end pays off. It's a religion here.

Loader dumper swings out of pit so dusty that background almost disappears in the haze. Despite fine rock dust, clean filters and regular service get 100,000 miles from engines.

"Each truck has two oil filters. A purolator full-flow and a Luber-Finer by-pass. Each calendar month we change one of the elements. The Purolator this month, the Luber-Finer next. We use an oil specially compounded for us by Black Bear. It's in between a Series II and a Series III. We're happy with it. When we do pull an engine down, it's clean—no sludge, no varnish, never a sticky ring.

"Lube oil is changed every 30 working days regardless. We arrived at this frequency by years of oil sample analysis and experience. Our maintenance records serve as a constant check.

"Air filters are the standard units that came with the Macks. We clean them as often as the jobs they are doing require. This may be daily. Sometimes twice a week. Always, regardless of job, they're cleaned once a week. The air cleaner plays a big part in engine life, and we watch it very carefully."

Pointing to an immaculate greasing pit, Dudley added, "Every night seven dumpers go over that pit. No truck ever goes longer than two weeks. They're lubed, but the lube man is also an inspector. Whatever he sees wrong, he reports to the night foreman, who decides whether the repair is immediate or whether it can be scheduled. The foreman must make out a report, on which I follow through.

"We also keep close control over what goes on in the field. We spot-check trucks on the road whenever we see one of ours. If we should see it smoking, it's either the driver or the truck. We pull it in to make sure.

"It pays off. I have specialty welders, for example, always dropping by, soliciting my cracked-head repairs. I tell them I don't have any. We keep out of trouble by eliminating the causes. In the case of cracked heads there are three main causes—faulty cooling, overfueling and continual overloading, perhaps through constant lugging. Our inspection checks out the cooling system, we keep the fuel injection set right to the manufacturer's specification and we've been able to get our drivers to cooperate pretty well in avoiding bad driver habits."

T & D's maintenance program has to have this emphasis on "Preventive" maintenance. Downtime cost is high for a company that has practically all its equipment working as an integrated team once jobs start to move. And the search for ways to improve operation never stops.

Keeping up with the field . . .

Dudley Adamson is always looking for new ideas and evaluating new products. He keeps posted through the trade magazines, and through active participation in technical groups. For example, he belongs to the Society of Maintenance Supervisors, a New York organization of men with common interests. In addition to his busy day, he finds time to be an active Program Committee chairman.

From his reading and broad contacts he picks up ideas and is not reluctant to try them out. One truck, for example, is fitted with a single lube-oil filter with by-pass and full-flow sections in the same element. if it works out, changing only one filter instead of two will simplify maintenance and require less service time.

When asked whether turbocharging wouldn't shorten trip times, Dudley answered, "The prospect of lower fuel consumption and higher power is attractive, in the right operation. We have two turbocharged tractors we use with low-bed trailers to move field equipment. Here we need and can use the extra power. But in metropolitan New York, with low speeds and frequent traffic delays, we have enough power in the naturally-aspirated Macks. We wouldn't get enough out of putting turbos on the fleet to warrant it."

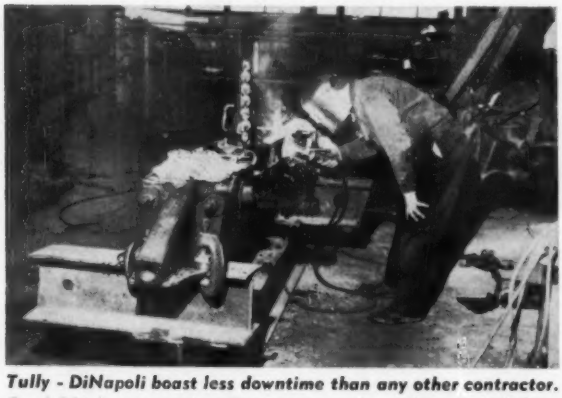
Key Man and the one to be sold . . .

Obviously, today's diesel man is versatile and knowledgeable. Though he works in a collar and tie, he knows every piece of equipment he has and how it works. He's engineer, traffic coordinator, businessman and purchasing agent all in one.

If, for example, T & D expands its fleet, Dudley Adamson will play a big part in making the decision of what to buy. He'll also write the specifications, in the same way he now specifies components, lube oil, filters, accessories—whatever he thinks is the best way to keep his fleet out of the shop and on the job. And he's in the best position to know.

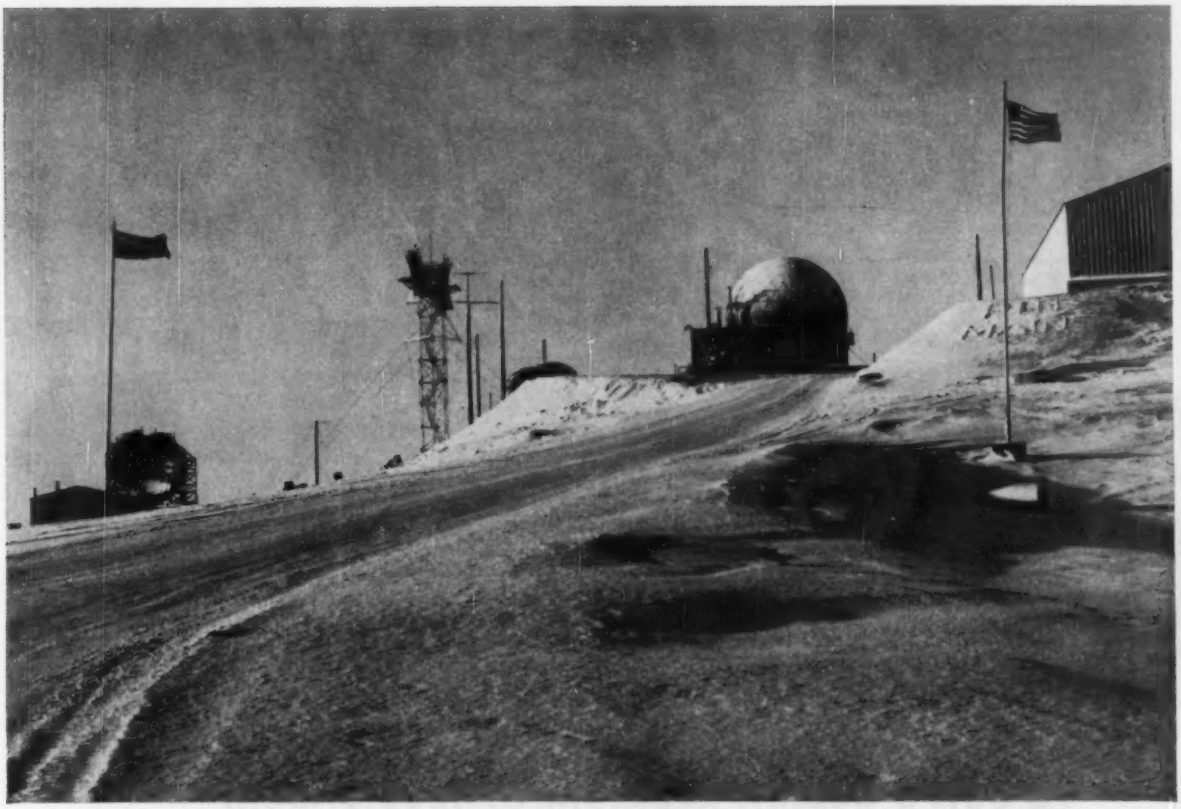
So today's Diesel man, as typified by Dudley Adamson, is an executive, part of the management team. His ability, knowledge and judgment must be relied upon to turn minute-to-minute and day-to-day problems into routine profitable operation by keeping the equipment on the job—the one place it makes money.

One big Mack-powered dumper is loaded with rock while dozer waits at top of pit to be called. Workman watches as borer eats into rock, raising abrasive dust that can kill engines.



Tully - DiNapoli boast less downtime than any other contractor. Good PM keeps repairs off emergency list, allows scheduling.

P & H crane is loaded on to flat-bed, ready to be taken to another job site. Four diesel tractors are always ready to go.



About 1200 miles from the North Pole, this air defense radar station is operated and maintained by the Federal Electric Corporation, service organization of International Telephone and Telegraph Corporation, who supplied these photographs.

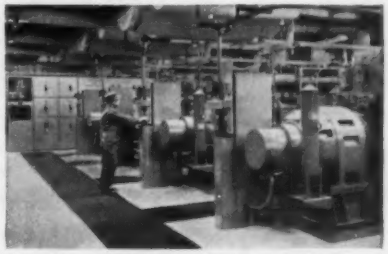
CHICAGO PNEUMATIC, WITH BENDIX® FUEL INJECTION, MEETS CRITICAL POWER NEEDS AT 50° BELOW ZERO

The radar station near Barter Island, Alaska, is a real proving ground for mechanical equipment. As part of the 3000-mile-long DEW (Distant Early Warning) line, the station is subjected to 50°-below-zero temperatures and 100-mph winds.

Under these conditions, five Chicago Pneumatic diesel engines, with General Electric generators, supply the station's prime power. The equipment is establishing an enviable record for reliability, having accumulated more than 87,000 operational hours in the last four years, without trouble. Each of the Chicago Pneumatic engines has been proved capable of operating beyond scheduled overhaul dates by a substantial number of hours.

This kind of dependability is essential at the station because it is located 300 air miles from the nearest re-supply point. In this frozen area there are no roads, and the sea approach is ice-blocked 10 months each year.

Bendix® Fuel Injection equipment provides "lifeblood" to the engines by performing efficiently under the most trying circumstances. The ability to meet all kinds of critical operating needs makes Bendix equipment widely favored in diesel operation. That's why it is being specified more and more as original equipment by diesel engine manufacturers.



Chicago Pneumatic 6-cylinder, 4-cycle diesel engines, with Bendix Fuel Injection equipment, are the "heart" of the arctic power plant.

Scintilla Division
Sidney, New York

THE Bendix CORPORATION

Export Sales & Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

For more information write in No. 105

To solve design problem of less shock, easier operation, EIMCO® CHOOSES CLARK CONVERTER

Put yourself in Eimco's place. In 45 years of building tractors and rugged underground loaders, you've earned a world-wide reputation for dependability. Now you're planning a new 100 hp crawler. Overall design is very important. So too is selection of power train components. You study and test—and finally pick a Clark torque converter as standard equipment. You name three reasons . . .

One—From the wide variety of torque converters Clark has in standard production, one can be selected to exactly fit the need. In this case, the Clark converter efficiently links an Eimco-built transmission with GM or Cummins diesel engine.

Two—Clark products have an excellent reputation for dependability.

Three—Price is fair, delivery good.

There are some important operational advantages too. Easy shifting, even first to fourth, at the flick of a finger. Shock-free changes of direction. Less wear and tear on power train and operator.

For more facts on the advantages of Clark torque converters as applied to *your* equipment, clip this coupon to your letterhead and mail to:

CLARK® EQUIPMENT

CLARK EQUIPMENT COMPANY
AUTOMOTIVE DIVISION
BUCHANAN 11, MICHIGAN

For more information write in No. 106

1961 ENGINE SPECIFICATIONS

Diesel • Dual-Fuel • Natural Gas

Data on Engines Manufactured by American Diesel Engine Builders

Alco Products, Inc. S-2
Allis-Chalmers, Engine-Material Handling Div. S-2
American M.A.R.C., Inc. S-2
Baldwin-Lima-Hamilton Corp. S-3
Caterpillar Tractor Co. S-3
Cerlist Diesel, Inc. S-3
Chicago Pneumatic Tool Co. S-3
Chrysler Corp.—Perkins S-4
Clark Brothers Co. S-4
Climax Engine & Pump Mfg. Co. S-4
Continental Motors Corp. S-4
Cooper-Bessemer Corp. S-5
Cummins Engine Co., Inc. S-5
Curtiss-Wright Corp. S-6
Enterprise Engine & Machinery Co. S-6
Fairbanks, Morse & Co. S-6
Ford Motor Co., Ford Div. S-6
GM-Cleveland Diesel Div. S-6
GM-Detroit Diesel Engine Div. ... S-6
GM-Electro-Motive Div. S-7
Gray Marine Motor Co. S-7
Harnischefeger Corp. P&H Diesel Div. S-7
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Nordberg Mfg. Co. S-9
Oliver Corp. S-9
Roth-Lorain S-10
R. H. Sheppard Co., Inc. S-10
Sterling Engine Co. S-10
Union Diesel Engine Co. S-10
Waukesha Motor Co. S-10
White Diesel Engine Div., White Motor Co. S-11
Witte Engine Works S-11
Worthington Corp. S-11

Foreign Diesel Engines Being Actively Sold in This Country

Burmeister and Wain American Corp. S-12
Daimler-Benz of N.A., Inc. (Mercedes-Benz) S-12
DAF of Holland, Inc. S-13
Henschel-Werke GmbH. S-13
Isuzu Motor Co. S-13
Klockner-Humboldt-Deutz S-13
Lister-Blackstone, Inc. S-14
M.A.N. S-14
Napier Engines, Inc. S-15
Hawker Siddeley Brush, Inc. (Petters; Mirrlees; National) S-15
Sulzer Bros., Ltd. S-15
Volvo Diesels S-16
Continental-Yanmar S-16

Symbol Meanings

Use

M—Marine propulsion service
S —Stationary service implying permanence of installation
P —Mobile, portable, or transportational service

Type

A—Diesel
B—Spark ignition natural gas engine
C—Diesel and dual-fuel
D—Diesel, dual-fuel, and natural gas engine
E—Gas engine angle compressor

Starting System

A—Air starting
E—Electric starting
G—Gasoline engine starting
H—Hand cranking
HY—Hydraulic starting

Fuel System

O—Own manufacture
B—American Bosch
S—Bendix-Scintilla
R—Roose-Master
D—Demco
A—Adeco
C—CAV
G—Robert Bosch
M—Simms

Ignition

B—Battery system
LM—Low tension magneto
HM—High tension magneto
P—Pulse generator

Supercharging Systems

M—Mechanical
T—Turbocharger

Reverse Gears

D—Direct reversing
S—Snow-Nabstedt
T—Twin Disc
C—Capitol
W—Western Gear
P—Paragon
O—Own manufacture
F—Falk
H—Hindmarch-Delaval

Notes:
Model numbers are for basic engines and may vary for other ratings and uses.
Dimensions are given to the next largest inch.
Dimensions and weights are for basic model unless otherwise indicated.

Alco Products, Inc., 530 Fifth Avenue, New York 36, N. Y.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
251	C	M-S-P	4	6	9 x 10½	550-1000	720-1000	B	....	E-A	T	W-F	136	60	98	22100
251	C	M-S-P	4	12	9 x 10½	1100-1950	720-1000	B	....	E-A	T	W**	168	61	110	32650
251	C	M-S-P	4	16	9 x 10½	1470-2600	720-1000	B	....	E-A	T	W**	197	61	104	42000
260	A	M-S-P	4	6	9 x 10½	1000-1365	720-1000	B	....	E-A	T	W**	144	62	89	23800
539	C	S-P	4	6	12⅛ x 13	580-660	600-740	B	....	E-A	....	....	156	60	82	34000†
539	C	S-P	4	6	12⅛ x 13	810-1000	600-740	B	....	E-A	T	....	156	60	115	36000†
539	C	S	4	8	12⅛ x 13	775-860	600-720	B	....	A	....	....	200	60	96	49000
539	C	S	4	8	12⅛ x 13	1080-1300	600-720	B	....	A	T	....	225	60	115	50000

* *Maximum or rated HP.* † *Dimensions and weight for portable unit.* ** *Lufkin/Western.*

Allis-Chalmers Mfg. Co., Engine-Material Handling Division, Milwaukee 1, Wis.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
D262	A	S-P	4	6	3⅛ x 4⅛	77	2200	R	....	E	....	....	39	23	31	890
6DA273	A	S-P	4	6	3¾ x 4½	74	2000	R	....	E	....	....	39	23	31	890
D273	A	M	4	6	3¾ x 4½	85	2800	R	....	E	....	C-S	39	27	31	879
D344	A	S-P	4	4	4⅞ x 5½	88	1800	B	....	E	....	....	37	30	46	1565
10000	A	M-S-P	4	6	4⅞ x 5½	145#	2200	B	....	E	....	T	48	30	41	1900
11000	A	M-S-P	4	6	4⅞ x 5½	210#	2200	B	....	E	T	T	48	30	50	1950
16000	A	M-S-P	4	6	5¼ x 6½	235#	2100	B	....	A-E	....	C	58	36	48	2905
21000	A	M-S-P	4	6	5¼ x 6½	350#	2100	B	....	A-E	T	C	58	36	57	3040
6DCB1879	A	M-S-P	4	6	6¾ x 8¾	282	1300	B	....	A-E-G	....	W	96	54	65	6925
6DCS1879	A	S-P	4	6	6¾ x 8¾	340	1300	B	....	A-E-G	M	....	100	54	65	7900
8DC2505	A	S-P	4	8	6¾ x 8¾	390	1300	B	....	A-E-G	....	....	149	52	92	12840
8DCS2505	A	M-S-P	4	8	6¾ x 8¾	516	1300	B	....	A-E-G	M	W	158	64	92	13240
G138	B	S-P	4	4	3⅝ x 3⅞	33.5	1800	..	B-HM	E	....	....	27	16	31	402
G149	B	S-P	4	4	3½ x 3⅞	40.5	2000	..	B-HM	E	....	....	30	20	46	500
G226	B	S-P	4	4	4 x 4½	58.6	1800	..	B-HM	E	....	....	37	20	56	700

* *Intermittent HP.* # *Actual power available for use at full throttle.*

American M. A. R. C., Inc., 1601 W. Florence Avenue, Inglewood, California

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
AC1	A	S	4	1	3½ x 3⅝	8.5	1800	B	....	H-E-HY	....	....	23	20	24	205
AC2**	A	S-M	4	2	3½ x 3⅝	17.5	1800	B	....	H-E-HY	....	....	30	30	28	350
WC1	A	S-M	4	1	3⅞ x 3⅝	8.5	1800	B	....	H-E-HY	....	....	24	18	25	205
WC2	A	S-M	4	2	3⅞ x 3¾	18	1800	B	....	H-E-HY	....	....	30	31	27	350
WD2	A	S	4	2	3⅞ x 4	25	1800	B	....	H-E-HY	....	....	30	31	27	480
AMARC-10††	A	M	2	1	2⅝ x 2 + 2	9¼	3500	G	....	E	....	D	24†	13†	42†	99†

†† *Outboard engine of opposed-piston type* † *Dimensions and weights apply to complete unit*
* *Horsepower is maximum at rpm given* ** *Also as GAC2 with Engine Carburetor and regulator for gas operation.*

Baldwin-Lima-Hamilton Corp., Industrial Equipment Division, Philadelphia 42, Pa.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.††
606-NA	C	M-S	4	6	12¾ x 15½	430–750	360–625	B-S	....	A-E	....	D†	159	76	91	35000
608-NA	C	M-S	4	8	12¾ x 15½	575–1000	360–625	B-S	....	A-E	....	D†	195	76	91	43500
606-SC	C	M-S	4	6	12¾ x 15½	650–1320	360–625	B-S	....	A-E	T	D†	170	86	91	36500
608-SC	C	M-S	4	8	12¾ x 15½	865–1750	360–625	B-S	....	A-E	T	D†	212	89	91	45000

*Continuous HP † Straight Reduction Gear or Reverse Reduction Gear. †† Weights are net for engine only.

Caterpillar Tractor Co., Peoria, Illinois

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.*	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
D398	A	M-S-P	4	V-12	6.25 x 8	950	1300	O	....	A-E-G	TA#	O	101	52	84	11500
D379	A	M-S-P	4	V-8	6.25 x 8	630	1300	O	....	A-E-G	TA#	O	79	57	84	8900
D353	A	M-S-P	4	6	6.25 x 8	500	1400	O	....	A-E-G-HY	TA#	T	81	47	66	6350
D342	A	M-S-P	4	6	5.75 x 8	320	1300	O	....	A-E-G-HY	T	T	90	42	57	5340
D343	A	M-S-P	4	6	5.4 x 6.5	420	2000	O	....	A-E-G-HY	TA#	T	72	40	52	4180
D343	A	M-S-P	4	6	5.4 x 6.5	360	2000	O	....	A-E-G-HY	T	T	72	40	52	4180
D333	A	M-S-P	4	6	4.5 x 5.5	255	2200	O	....	A-E-G-HY	TA#	T	58	32	39	2140
D333	A	M-S-P	4	6	4.5 x 5.5	205	2200	O	....	A-E-G-HY	T	T	58	32	39	2140
D330	A	M-S-P	4	4	4.5 x 5.5	170	2200	O	....	A-E-G-HY	TA#	C	45	36	39	1630
D330	A	M-S-P	4	4	4.5 x 5.5	135	2200	O	....	A-E-G-HY	T	C	45	36	39	1630
D320	A	M-S-P	4	4	4 x 5	120	2400	O	....	A-E-G-HY	TA#	C	40	29	35	1300
D320	A	M-S-P	4	4	4 x 5	105	2400	O	....	A-E-G-HY	T	C	40	29	35	1300
D311	A	M-S-P	4	4	4 x 5	75	2400	O	....	A-E-G-HY	....	C	40	29	35	1225
1673	A	P	4	6	4.5 x 5.5	220	2200	O	....	A-E	TA#	....	53	30	48	2070
G398##	B	S	4	V-12	6.25 x 8	...	...	..	LM	A-E-G	TA#	....	...	...	...	.....
D398##	B	S	4	V-12	6.25 x 8	...	...	..	LM	A-E-G	....	....	...	...	...	.....
G379##	B	S	4	V-8	6.25 x 8	...	...	..	LM	A-E-G	TA#	....	...	...	...	.....
G379##	B	S	4	V-8	6.25 x 8	...	...	..	LM	A-E-G	....	....	...	...	...	.....
G353##	B	S	4	6	6.25 x 8	...	...	..	LM	A-E-G-HY	TA#	....	...	...	...	.....
G353##	B	S	4	6	6.25 x 8	...	...	..	LM	A-E-G-HY	....	....	...	...	...	.....
G342	B	S	4	6	5.75 x 8	280**	1200	..	LM	A-E-G-HY	TA#	....	81	45	65	5240
G342	B	S	4	6	5.75 x 8	235**	1300	..	LM	A-E-G-HY	....	....	81	45	65	5240

* Maximum or rated horsepower ** Continuous horsepower # Turbocharged and aftercooled. ## Complete specifications not available at time of preparation.

(Reprinted from last year)

Cerlist Diesel, Inc., Burlington, N. C.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
3	A	M-S-P	2	3	4 x 4½	85	3000	G	....	E-A-Hy	....	....	32	23	35	605

* Maximum

Chicago Pneumatic Tool Company, 6 East 44th Street, New York 17, N. Y.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
39-CP	D	S-P	4	3	9 x 10½	129–215	600–1000	S	LM-HM	A	....	....	68	44	67	8900
49-CP	D	S-P	4	4	9 x 10½	172–286	600–1000	S	LM-HM	A	....	....	84	44	67	10690
69-CP	D	S-P	4	6	9 x 10½	258–430	600–1000	S	LM-HM	A	....	....	112	44	67	14240
89-CP	D	S-P	4	8	9 x 10½	344–572	600–1000	S	LM-HM	A	....	....	140	44	67	16750
69-CPS	D	S-P	4	6	9 x 10½	396–660	600–1000	S	LM-HM	A	T	....	156	58	84	15740
89-CPS	D	S-P	4	8	9 x 10½	530–880	600–1000	S	LM-HM	A	T	....	184	58	84	18250
39CPA	D	S-P	4	3	9½ x 10½	145–240	600–1000	S	LM-HM	A	....	....	68	44	67	8900
49CPA	D	S-P	4	4	9½ x 10½	193–320	600–1000	S	LM-HM	A	....	....	84	44	67	10690
69CPA	D	S-P	4	6	9½ x 10½	290–480	600–1000	S	LM-HM	A	....	....	112	44	67	14240
89CPA	D	S-P	4	8	9½ x 10½	385–640	600–1000	S	LM-HM	A	....	....	140	44	67	16750
69CPSA	D	S-P	4	6	9½ x 10½	442–735	600–1000	S	LM-HM	A	T	....	156	58	84	15740
89CPSA	D	S-P	4	8	9½ x 10½	590–980	600–1000	S	LM-HM	A	T	....	184	58	84	18250
69-CPH	D	S-P	4	6	9 x 10½	258–450	600–1050	B-S	LM-HM	A	....	....	129	68	87	15500
89-CPH	D	S-P	4	8	9 x 10½	344–600	600–1050	B-S	LM-HM	A	....	....	158	68	87	19100
69-CHPS	D	S-P	4	6	9 x 10½	534–930	600–1050	B-S	LM-HM	A	T	....	129	68	89	16500
89-CHPS	D	S-P	4	8	9 x 10½	712–1240	600–1050	B-S	LM-HM	A	T	....	158	68	89	20100
412-CP	D	S	4	4	11 x 12	294–368	600–750	S	LM-HM	A	....	....	106	47	95	21200
512-CP	D	S	4	5	11 x 12	368–460	600–750	S	LM-HM	A	....	....	124	55	95	25300
612-CP	D	S-P	4	6	11 x 12	441–552	600–750	S	LM-HM	A	....	....	143	55	95	28400
812-CP	D	S-P	4	8	11 x 12	588–736	600–750	S	LM-HM	A	....	....	178	68	95	32800
412-CPS	D	S	4	4	11 x 12	450–562	600–750	S	LM-HM	A	T	....	128	47	113	23400
512-CPS	D	S	4	5	11 x 12	562–703	600–750	S	LM-HM	A	T	....	146	55	113	27500
612-CPS	D	S-P	4	6	11 x 12	675–843	600–750	S	LM-HM	A	T	....	164	55	113	31600
812-CPS	D	S-P	4	8	11 x 12	900–1124	600–750	S	LM-HM	A	T	....	215	68	113	35700
414-CP	D	S	4	4	11 x 14¼	262–350	450–600	S	LM-HM	A	....	....	...	...	...	.....
514-CP	D	S	4	5	11 x 14¼	328–438	450–600	S	LM-HM	A	....	....	...	...	...	.....
614-CP	D	S-P	4	6	11 x 14¼	393–525	450–600	S	LM-HM	A	....	....	143	55	95	29800
814-CP	D	S-P	4	8	11 x 14¼	524–700	450–600	S	LM-HM	A	....	....	178	68	95	34500
614-CPS	D	S-P	4	6	11 x 14¼	600–800	450–600	S	LM-HM	A	T	....	164	55	113	32000
814-CPS	D	S-P	4	8	11 x 14¼	800–1068	450–600	S	LM-HM	A	T	....	215	68	113	36000
623-CPS	D	S	4	6	12 x 13	1140–1419	600–750	S	LM-HM	A	T	....	196	86	135	39000
823-CPS	D	S	4	8	12 x 13	1520–1892	600–750	S	LM-HM	A	T	....	225	86	135	.....
1023-CPS	D	S	4	10	12 x 13	1900–2365	600–750	S	LM-HM	A	T	....	266	86	135	55000
625-CPS	D	S	4	6	12 x 15	984–1320	450–600	S	LM-HM	A	T	....	196	86	135	39000
825-CPS	D	S	4	8	12 x 15	1312–1760	450–600	S	LM-HM	A	T	....	225	86	135	47000
1025-CPS	D	S	4	10	12 x 15	1640–2200	450–600	S	LM-HM	A	T	....	266	86	135	55000
460-CP	D	S	4	4	16 x 20	620–646	360–375	B-S	LM-HM	A	....	....	171	85	125	64700
560-CP	D	S	4	5	16 x 20	775–808	360–375	B-S	LM-HM	A	....	....	197	85	125	72800
660-CP	D	S	4	6	16 x 20	930–969	360–375	B-S	LM-HM	A	....	....	223	85	125	80900
860-CP	D	S	4	8	16 x 20	1240–1292	360–375	B-S	LM-HM	A	....	....	275	106	125	101440
460-CPS	D	S	4	4	16 x 20	950–990	360–375	B-S	LM-HM	A	T	....	210	85	125	68130
560-CPS	D	S	4	5	16 x 20	1188–1237	360–375	B-S	LM-HM	A	T	....	236	106	125	76540
660-CPS	D	S	4	6	16 x 20	1425–1485	360–375	B-S	LM-HM	A	T	....	262	106	125	84950
860-CPS	D	S	4	8	16 x 20	1900–1980	360–375	B-S	LM-HM	A	T	....	320	116	125	106800
462-CP	D	S	4	4	16 x 22	570–632	300–333	B-S	LM-HM	A	....	....	171	85	125	64700
562-CP	D	S	4	5	16 x 22	713–790	300–333	B-S	LM-HM	A	....	....	197	85	125	72800
662-CP	D	S	4	6	16 x 22	855–948	300–333	B-S	LM-HM	A	....	....	223	85	125	80900
862-CP	D	S	4	8	16 x 22	1140–1264	300–333	B-S	LM-HM	A	....	....	275	106	125	101440
462-CPS	D	S	4	4	16 x 22	872–968	300–333	B-S	LM-HM	A	T	....	210	85	125	68130
562-CPS	D	S	4	5	16 x 22	1090–1210	300–333	B-S	LM-HM	A	T	....	236	106	125	76540
662-CPS	D	S	4	6	16 x 22	1308–1452	300–333	B-S	LM-HM	A	T	....	262	106	125	84950
862-CPS	D	S	4	8	16 x 22	1744–1936	300–333	B-S	LM-HM	A	T	....	320	116	125	106800

* Continuous horsepower *Length, width, height and weight are 1960 figures.*

Chrysler Corporation, Marine and Industrial Div., Detroit 31, Mich.
Perkins Engines

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
FOUR 99	A	M-S-P	4	4	3 x 3½	34–55	3000–4000	C	....	E	....	C-P-V	22	20	25	341
P3/144	A	M-S-P	4	3	3½ x 5	33–45	2000–2500	C	....	E	....	C-P-V	23	23	30	448
FOUR 203	A	M-S-P	4	4	3.6 x 5	47–72	2000–3000	C	....	E	....	C-P-V	26	24	30	526
SIX 305	A	M-S-P	4	6	3.6 x 5	71–102	2000–3000	C	....	E	....	C-P-V	34	24	33	740
FOUR 270	A	M-S-P	4	4	4¼ x 4¾	57–80	2000	C	....	E	....	C-P-V	32	22	31	680
SIX 354	A	M-S-P	4	6	3⅞ x 5	85–130	2000–2800	C	....	E	....	C-P-V	35	23	34	1020

V—Warner Velvet Drive
** Where a horsepower and rpm range is shown the low end is the continuous industrial rating and the high and the maximum or rated power.*

Clark Bros. Co., Olean, New York

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.*	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
HMA-4	E	S-P	2	4	8¼ x 8¼	175	600	O	LM	A	....	....	246	105	107	.....
HMA-6	E	S-P	2	6	8¼ x 8¼	265	600	O	LM	A	....	....	273	105	107	.....
HMA-8	E	S-P	2	8	8¼ x 8¼	350	600	O	LM	A	....	....	301	105	107	.....
HMA-10	E	S-P	2	10	8¼ x 8¼	440	600	O	LM	A	....	....	366	105	107	.....
HMB-6	E	S-P	2	6	8⅝ x 8⅞	330	600	O	LM	A	....	....	337	105	118	.....
HMB-8	E	S-P	2	8	8⅝ x 8⅞	440	600	O	LM	A	....	....	365	105	118	.....
HMB-10	E	S-P	2	10	8⅝ x 8⅞	555	600	O	LM	A	....	....	417	105	118	.....
TMB-8	E	S-P	2	8	8⅝ x 8⅞	525	600	O	LM	A	T	....	365	105	118	.....
TMB-10	E	S-P	2	10	8⅝ x 8⅞	660	600	O	LM	A	T	....	417	105	118	.....
TVM-10	E	S-P	2	10	8½ x 9	825	600	O	LM	A	T	....	168	184	87	42000
TVM-12	E	S-P	2	12	8½ x 9	1000	600	O	LM	A	T	....	189	184	87	52000
HRA-4T	E	S	2	4	14 x 14	660	330	O	LM	A	T	....	196	204	108	70000
HRA-5T	E	S	2	5	14 x 14	800	330	O	LM	A	T	....	214	204	108	83000
HRA-6T	E	S	2	6	14 x 14	1000	330	O	LM	A	T	....	228	204	108	97000
HRA-8T	E	S	2	8	14 x 14	1320	330	O	LM	A	T	....	264	204	108	109000
HRA-10T	E	S	2	10	14 x 14	1600	330	O	LM	A	T	....	300	204	108	122000
TBA-5	E	S	2	5	17 x 17	1500	300	O	LM	A	T	....	265	138	213	156500
TBA-6	E	S	2	6	17 x 17	1800	300	O	LM	A	T	....	300	138	213	176500
TBA-8	E	S	2	8	17 x 17	2400	300	O	LM	A	T	....	363	138	213	224500
TBA-10	E	S	2	10	17 x 17	3000	300	O	LM	A	T	....	413	138	213	278000
TLA-5	E	S	2	5	17 x 19	1700	300	O	LM	A	T	....	303	224	192	160000
TLA-6	E	S	2	6	17 x 19	2000	300	O	LM	A	T	....	323	224	192	180000
TLA-8	E	S	2	8	17 x 19	2700	300	O	LM	A	T	....	344	224	192	233000
TLA-10	E	S	2	10	17 x 19	3400	300	O	LM	A	T	....	407	224	192	282000
TPV-10	B	S	2	10	17 x 19	4000	330	O	P or LM	A	T	....	229	134	158	210000
TPV-12	B	S	2	12	17 x 19	4800	330	O	P or LM	A	T	....	260	134	158	250000
TPV-16	B	S	2	16	17 x 19	6400	330	O	P or LM	A	T	....	320	134	158	327000
TCV-12	E	S	2	12	17 x 19	4000	300	O	P or LM	A	T	....	300	396	159	324000
TCV-16	E	S	2	16	17 x 19	5500	300	O	P or LM	A	T	....	378	396	159	427800

** Continuous* *† Semi-portable*

Climax Engine Mfg. Co., Division of Waukesha Motor Co., Factory—Clinton, Iowa

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
R165	B	S-P	4	6	6½ x 7	140**	1050	..	B-HM	A-E-G	....	.. ..	74	30	51	3250
K67	B	S-P	4	6	7 x 7	194**	1050	..	B-HM	A-E-G	....	....	71	30	58	5400
K75	B	S-P	4	6	7½ x 7	216**	1050	..	B-HM	A-E-G	....	....	71	30	58	5400
V80	B	S	4	8	7 x 7	250**	1050	..	B-HM	A-E-G	....	....	79	51	59	8400
V85	B	S	4	8	7½ x 7	285**	1050	..	B HM	A-E-G	....	....	79	51	59	8600
V122	B	S	4	12	7 x 7	380**	1050	..	B-HM	A-E-G	....	....	103	51	59	11000
V125	B	S	4	12	7½ x 7	444**	1050	..	B-HM	A-E-G	....	....	103	51	59	11600

* Continuous HP ** Based on natural gas fuel

Continental Motors Corporation, Muskegon, Michigan

Model	Type	Use	Cycle	No. Cyl	Bore & Stroke In.	HP.	R.P.M.†	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight lb.
ZD129	A	S	4	4	3¾ x 3½	34	2000	R	....	E	....	....	....	....	....	485
GD157	A	M-S-P	4	4	3½ x 4⅝	39	2000	R	....	E	....	....	32	16	31	605
GD193	A	..	4	4	3¾ x 4⅝	55.5	2200	R	....	E	....	....	....	....	....	.....
GD4193	A	P	4	4	3¾ x 4⅝	66	2600	R	....	E	....	....	....	....	....	.....
ED201	A	S	4	4	3¾ x 4¾	45.8	2000	R	....	E	....	....	....	....	....	655
ED208	A	S	4	4	3¹¹⁄₁₆ x 4⅞	61.5	2200	R	....	E	....	....	....	....	....	.....
ED223	A	S	4	4	3¹¹⁄₁₆ x 4⅞	66	2200	R	....	E	....	....	....	....	....	.....
HD243	A	S-P	4	4	3¾ x 5½	67.8	2200	R	....	E	....	....	34	22	35	840
HD260	A	S	4	4	3⅞ x 5½	74.9	2400	R	....	E	....	....	34	22	35	840
HD277	A	S	4	4	4 x 5½	79	2400	R	....	E	....	....	34	22	35	850
JD382	A	S	4	4	4½ x 6	87.4	2000	R	....	E	....	....	....	....	....	925
JD403	A	..	4	4	4½ x 6	91.5	2000	R	....	E	....	....	....	....	....	.....
TD427	A	S	4	6	4⅝ x 4⅞	132	2200	R	....	E	....	....	47	25	36	1300
RD572	A	S	4	6	4¾ x 5½	154	2000	R	....	E	....	....	52	30	43	1845
VD603	A	S	4	8	4¾ x 4¼	197	2600	R	....	E	....	....	44	34	47	1696
SD802	A	S	4	6	5⅛ x 5½	202	1800	R	....	E	....	....	....	....	....	2160
TD6427	A	M-P	4	6	4⅝ x 4⅞	146.5	2600	R	....	E	....	....	47	25	36	1270
RD6572	A	M-P	4	6	4¾ x 5½	172	2400	R	....	E	....	....	52	30	46	1785
VD8603	A	P	4	8	4¾ x 4¼	200	2800	R	....	E	....	....	44	34	47	1680
SD6802	A	M-P	4	6	5⅛ x 5½	225	2200	R	....	E	....	....	....	....	....	2140
Y-112	B	S-P	4	4	3⅛ x 3½	30.7	2800	..	B-LM-HM	E	....	....	26	15	26	265
F-162	B	S-P	4	4	3⅞ x 4⅛	49.5	2800	..	B-LM-HM	E	....	....	29	16	29	370
F-226	B	S-P	4	6	3⅛ x 4⅛	67	2800	..	B-LM-HM	E	....	....	36	16	29	510
F-244	B	..	4	6	3⅞ x 4⅛	72.5	2800	..	B-LM-HM	E	....	....	....	....	....	790
M-330	B	S-P	4	6	4 x 4⅛	104	2800	..	B-LM-HM	E	....	....	43	22	34	725
M-363	B	..	4	6	4 x 4¹¹⁄₁₆	109.3	2800	..	B-LM-HM	E	....	....	....	....	....	800
H-260	B	..	4	4	3⅞ x 5½	57.1	1800	..	B-LM-HM	E	....	....	34	22	35	740
H-277	B	..	4	4	4 x 5½	60.4	1800	..	B-LM-HM	E	....	....	....	....	....	....
K-363	B	..	4	6	4 x 4¹¹⁄₁₆	130	2600	..	B-LM-HM	E	....	....	....	....	....	985
J-382	B	..	4	4	4½ x 6	83.5	1600	..	B-LM-HM	E	....	....	....	....	....	950
T-427	B	..	4	6	4⅝ x 4⅞	135	2400	..	B-LM-HM	E	....	....	47	21	36	1100
B-427	B	S-P	4	6	4⅝ x 4⅞	127	2800	..	B-LM-HM	E	....	....	46	22	34	870
U-501	B	S-P	4	6	4½ x 5¼	163.7	2600	..	B-LM-HM	E	....	....	52	28	45	1670
R-602	B	S-P	4	6	4⅞ x 5½	197.5	2600	..	B-LM-HM	E	....	....	52	28	45	1670
S-749	B	S-P	4	6	5⅛ x 5½	190.5	2000	..	B-LM-HM	E	....	....	58	28	48	1910
S-820	B	..	4	6	5⅝ x 5½	268.6	2600	..	B-LM-HM	E	....	....	....	....	....	2170

† R.P.M. is Governed Speed.

The Cooper-Bessemer Corporation, Mt. Vernon, Ohio

Model**	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.†	Height In.††	Weight Lb.†††
FW6	A	M-S-P	4	6	9 x 10½	430	1000	S	....	A		O	130	35	80	17800
FW6T	A	M-S-P	4	6	9 x 10½	720	1000	S	....	A	T	O	176	35	80	18300
FWB-6-LT	A	M-S-P	4	6	9 x 10½	990	1000	S	....	A	T	O	176	35	80	23300
FVA8	A	M-S-P	4	8	9 x 10½	575	1000	S	....	A		O	102	44	58	22000
FVB8T	A	M-S-P	4	8	9 x 10½	1320	1000	S	....	A	T	O	124	44	58	27240
FVA12	A	M-S-P	4	12	9 x 10½	860	1000	S	....	A	....	O	140	44	58	26000
FVB12T	A	M-S-P	4	12	9 x 10½	1980	1000	S	....	A	T	O	140	44	58	37800
FVA16	A	M-S-P	4	16	9 x 10½	1150	1000	S	....	A	....	O	165	44	58	32000
FVB16T	A	M-S-P	4	16	9 x 10½	2640	1000	S	....	A	T	O	165	44	58	46430
JS5	D	S	4	5	13 x 16	515	450	O	B	A	....	....	149	45	80	41000
JS6	D	M-S	4	6	13 x 16	705	514	O	B	A	....	D	171	45	80	44000
JS6T	D	M-S	4	6	13 x 16	1485	514	O	B	A	T	D	200	45	80	45000
JS7	D	S	4	7	13 x 16	820	514	O	B	A	....	....	193	45	80	48000
JS7T	D	S	4	7	13 x 16	1735	514	O	B	A	T	....	221	45	80	49000
JS8	D	M-S	4	8	13 x 16	935	514	O	B	A	....	D	210	45	80	51000
JS8T	D	M-S	4	8	13 x 16	1980	514	O	B	A	T	D	239	45	80	52000
KSV-12	D	S	4	12	13½ x 16½	3450	475	S	B	A	T	....	237	74	144	81000
KSV-16	D	S	4	16	13½ x 16½	4600	475	S	B	A	T	....	284	74	144	106000
LS6	D	M-S	4	6	15½ x 22	965	360	O	B	A	....	D	224	56	120	76000
LS6T	D	M-S	4	6	15½ x 22	2040	360	O	B	A	T	D	251	56	120	77000
LS7	D	S	4	7	15½ x 22	1125	360	O	B	A	....	....	248	56	120	91000
LS7T	D	S	4	7	15½ x 22	2380	360	O	B	A	T	....	270	56	120	92000
LS8	D	M-S	4	8	15½ x 22	1285	360	O	B	A	....	D	276	56	120	106000
LS8T	D	M-S	4	8	15½ x 22	2720	360	O	B	A	T	D	299	56	120	107000
LSV12	D	M-S	4	12	15½ x 22	1925	360	O	B	A	....	D	252	68	117	194500
LSV12T	D	M-S	4	12	15½ x 22	4100	360	O	B	A	T	D	300	68	117	197500
LSV16	D	M-S	4	16	15½ x 22	2565	360	O	B	A	....	D	307	68	117	232500
LSV16T	D	M-S	4	16	15½ x 22	5450	360	O	B	A	T	D	355	68	117	237500
GMXD-4	E	S-P***	2	4	9¾ x 10½	265	450	..	LM	A	M	....	....	....	....	.....
GMXD-6	E	S-P***	2	6	9¾ x 10½	400	450	..	LM	A	M	....	....	....	....	.....
GMXD-8	E	S-P***	2	8	9¾ x 10½	550	450	..	LM	A	M	....	....	....	....	.....
GMXD-10	E	S-P***	2	10	9¾ x 10½	660	450	..	LM	A	M	....	....	....	....	.....
GMXF-4	E	S-P***	2	4	9¾ x 10½	330	450	..	LM	A	T	....	....	....	....	.....
GMXF-6	E	S-P***	2	6	9¾ x 10½	500	450	..	LM	A	T	....	....	....	....	.....
GMXF-8	E	S-P***	2	8	9¾ x 10½	660	450	..	LM	A	T	....	....	....	....	.....
GMXF-10	E	S-P***	2	10	9¾ x 10½	825	450	..	LM	A	T	....	....	....	....	.....
GMVA-4	E	S	2	4	14 x 14	540	300	..	LM	A	M	....	....	....	....	.....
GMVA-6	E	S	2	6	14 x 14	800	300	..	LM	A	M	....	....	....	....	.....
GMVA-8	E	S	2	8	14 x 14	1100	300	..	LM	A	M	....	....	....	....	.....
GMVA-10	E	S	2	10	14 x 14	1350	300	..	LM	A	M	....	....	....	....	.....
GMVC-4	E	S	2	4	14 x 14	720	300	..	LM	A	T	....	....	....	....	.....
GMVC-6	E	S	2	6	14 x 14	1000	300	..	LM	A	T	....	....	....	....	.....
GMVC-8	E	S	2	8	14 x 14	1440	300	..	LM	A	T	....	....	....	....	.....
GMVC-10	E	S	2	10	14 x 14	1800	300	..	LM	A	T	....	....	....	....	.....
GMWA-6	E	S	2	6	18 x 20	1500	250	..	LM	A	M	....	....	....	....	.....
GMWA-8	E	S	2	8	18 x 20	2000	250	..	LM	A	M	....	....	....	....	.....
GMWA-10	E	S	2	10	18 x 20	2500	250	..	LM	A	M	....	....	....	....	.....
GMWC-6	E	S	2	6	18 x 20	2000	250	..	LM	A	T	....	....	....	....	.....
GMWC-8	E	S	2	8	18 x 20	2800	250	..	LM	A	T	....	....	....	....	.....
GMWC-10	E	S	2	10	18 x 20	3500	250	..	LM	A	T	....	....	....	....	.....

** *Engines have open combustion chamber.* †† *Height is given above shaft.* † *Width is between bolt centers.* ††† *All weights and dimensions for stationary units.*

* *Continuous HP.* *** *Semi-portable.*

Cummins Engine Company, Inc., Columbus, Indiana

Model	Type	Use††	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
J-70	A	M-S-P	4	4	4½ x 5	70	2000	O	....	E	....	....	35	25	45	1185
J-80	A	M-S-P	4	4	4½ x 5	80	2500	O	....	E	....	....	35	25	45	1185
J-6	A	M-S-P	4	6	4½ x 5	100	1800	O	....	E	....	T	46	27	42	1505
JF-6	A	M-S-P	4	6	4½ x 5	110	2200	O	....	E	....	T	46	27	42	1545
JN-130	A	M-S-P	4	6	4½ x 5	130	2500	O	....	E	....	T	46	27	43	1630
JNS-6	A	M-S-P	4	6	4½ x 5	175	2500	O	....	E	M	S	46	26	44	1610
JS-6	A	M-S-P	4	6	4½ x 5	160	2500	O	....	E	M	....	46	26	40	1655
JT-6	A	M-S-P	4	6	4½ x 5	175	2500	O	....	E	T	S	46	27	44	1670
C-90	A	M-S-P	4	4	4½ x 5	90	2000	O	....	E	....	....	36	25	45	1185
C-105	A	M-S-P	4	4	4½ x 5	105	2500	O	....	E	....	....	36	25	45	1185
C-160	A	M-S-P	4	6	4½ x 5	160	2500	O	....	E	....	....	50	27	43	1630
C-140	A	M-S-P	4	4	4½ x 5	140	2500	O	....	E	T	....	36	26	44	1335
C-175	A	M-S-P	4	6	4½ x 5	175	2500	O	....	E	T	....	46	26	44	1670
C-180	A	M-S-P	4	6	4½ x 5	180	2500	O	....	E	M	....	46	26	44	1610
HRC-4	A	M-S-P	4	4	5½ x 6	115	1800	O	....	E	....	T	45	30	48	1755
H-6	A	M-S-P	4	6	4½ x 6	160	1800	O	....	E	....	T	58	30	49	2370
HR-6	A	M-S-P	4	6	5½ x 6	175	1800	O	....	E	....	T	58	30	49	2370
HRF-6	A	P	4	6	5½ x 6	190	2000	O	....	E	....	....	60	30	49	2385
HS-6	A	S-P	4	6	4½ x 6	210	1800	O	....	E	M	T	59	33	49	2475
HRS-6	A	M-S-P	4	6	5½ x 6	240	1800	O	....	E	M	T	60	32	49	2610
NHC-4	A	M-S-P	4	4	5½ x 6	130	2000	O	....	E	....	T	45	27	49	1895
NT-165	A	M-S-P	4	4	5½ x 6	165	2000	O	....	E	T	....	43	30	54	2020
NT-180	A	P	4	4	5½ x 6	180	2100	O	....	E	T	....	45	36	47	1995
NT-200	A	P	4	4	5½ x 6	200	2100	O	....	E	T	....	45	36	47	1995
NH-180	A	P	4	6	4½ x 6	180	2100	O	....	E	....	....	60	31	49	2400
NH-195	A	P	4	6	4½ x 6	195	2100	O	....	E	....	....	60	31	49	2420
NHE-180	A	P	4	6	5½ x 6	180	1950	O	....	E	....	....	61	32	49	2400
NHE-195	A	P	4	6	5½ x 6	195	1950	O	....	E	....	....	61	32	49	2420
NH-220	A	M-S-P	4	6	5½ x 6	220	2100	O	....	E	....	C	61	32	49	2420
NH-250	A	P	4	6	5½ x 6	250	2100	O	....	E	....	....	61	28	48	2590
NHS-6	A	M-S-P	4	6	5½ x 6	290	2100	O	....	E	M	C	60	35	50	2720
NHRS-6	A	M-S-P	4	6	5½ x 6	320	2100	O	....	E	M	C	60	35	50	2720
NT-6	A	M-S-P	4	6	5½ x 6	250	2100	O	....	E	T	C	61	39	49	2515
NTO-6	A	M-S-P	4	6	5½ x 6	262	2100	O	....	E	T	C	61	39	49	2515
NRT-6	A	M-S-P	4	6	5½ x 6	300	2100	O	....	E	T	C	60	39	49	2525
NRTO-6	A	M-S-P	4	6	5½ x 6	335	2100	O	....	E	T	C	60	39	49	2585
NT-380	A	P	4	6	5½ x 6	380	2300	O	....	E	T	....	60	39	49	2520
V8-350	A	P	4	8	5½ x 5	350	2500	O	....	E	....	....	57	46	47	2940
VT8-430	A	P	4	8	5½ x 5	430	2500	O	....	E	T	....	57	46	47	2990
NVH-12	A	M-S-P	4	12	5½ x 6	450	2100	O	....	E	....	S	74	50	54	5150
VT-12	A	M-S-P	4	12	5½ x 6	600	2100	O	....	E	T	C	74	45	61	5300
V12-525	A	S-P	4	12	5½ x 6	525	2100	O	....	E	....	....	73	50	54	5200
VT12-700	A	M-S-P	4	12	5½ x 6	700	2100	O	....	E	T	T	73	44	60	5700
L-6	A	M-S	4	6	7 x 10	265	1000	O	....	A-E	....	C	99	40	59	7590
LR-6	A	M-S	4	6	7¼ x 10	320	1100	O	....	A-E	....	C	100	40	59	7590
LRT-6	A	M-S	4	6	7¼ x 10	450	1100	O	....	A-E	T	C	100	40	59	7690

* *Maximum HP* †† *All except "L" models suitable for automotive and other portable applications.*

Curtiss-Wright Corp., Utica Division, Utica, Michigan

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.*	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
12V142	A	M-P	4	12	5¾ x 6¼	900	2300	B	....	A-HY	T	C	78	46	55	4000

* *Maximum or Rated.*

Enterprise Engine & Machinery Co., Subsidiary of General Metals Corp., 18th & Florida Streets, San Francisco, Calif.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
DM6	D	M-S-P	4	6	8 x 10	146-324	450-1000	S	LM-P	A-E	....	**	92	41	64	13200
DM36	D	M-S-P	4	6	8 x 10	231-762	450-1000	S	LM-P	A-E	T	**	92	41	64	13800
DM8	D	M-S-P	4	8	8 x 10	194-432	450-1000	S	LM-P	A-E	....	**	116	41	64	16100
DM38	D	M-S-P	4	8	8 x 10	308-1015	450-1000	S	LM-P	A-E	T	**	116	41	64	18000
DG-6	D	M-S-P	4	6	12 x 15	273-819	250-750	S	LM-P	A	....	D	147	58	99	38800
DG-36	D	M-S-P	4	6	12 x 15	434-1928	250-750	S	LM-P	A	T	D	147	58	99	39900
DG-8	D	M-S-P	4	8	12 x 15	364-1092	250-750	S	LM-P	A	....	D	181	58	99	48000
DG-38	D	M-S-P	4	8	12 x 15	578-2570	250-750	S	LM-P	A	T	D	181	58	99	49962
DQ-6	D	M-S-P	4	6	16 x 20	647-1036	250-400	S	LM-P	A	....	D	197	74	126	87400
DQ-36	D	M-S-P	4	6	16 x 20	1028-2437	250-400	S	LM-P	A	T	D	197	74	126	89600
DQ-8	D	M-S-P	4	8	16 x 20	863-1381	250-400	S	LM-P	A	....	D	245	74	126	105513
DQ-38	D	M-S-P	4	8	16 x 20	1371-3249	250-400	S	LM-P	A	T	D	245	74	126	107913
DR-6	D	M-S-P	4	6	17 x 21	767-1228	250-400	S	LM-P	A	....	D	197	74	126	89900
DR-36	D	M-S-P	4	6	17 x 21	1219-2889	250-400	S	LM-P	A	T	D	197	74	126	92500
DR-8	D	M-S-P	4	8	17 x 21	945-1637	250-400	S	LM-P	A	....	D	245	74	126	107300
DR-38	D	M-S-P	4	8	17 x 21	1625-3852	250-400	S	LM-P	A	T	D	245	74	126	109900
DRV-12	D	M-S-P	4	12	17 x 21	1228-2455	200-400	S	LM-P	A	....	D	197	96	145	142600
DRV-12-3	D	M-S-P	4	12	17 x 21	2891-5782	200-400	S	LM-P	A	T	D	197	96	145	147900
DRV-16	D	M-S-P	4	16	17 x 21	1637-3274	200-400	S	LM-P	A	....	D	245	96	145	181800
DRV-16-3	D	M-S-P	4	16	17 x 21	3852-7703	200-400	S	LM-P	A	T	D	245	96	145	189100

**Continuous HP* †*All models available with trifuel equipment* ***Reverse and reduction gear used—make varies.*

Fairbanks, Morse & Company, Beloit Division, Beloit, Wisc.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
31A18	C	M-S	2	6	18 x 27	2100	277	O	....	A	....	....	...	...	...	.....
31A18	C	M-S	2	8	18 x 27	2800	277	O	....	A	....	....	...	...	...	.....
31A18	C	M-S	2	10	18 x 27	3500	277	O	....	A	....	....	...	...	...	.....
31A18	C	M-S	2	12	18 x 27	4200	277	O	....	A	....	....	...	...	...	.....
38F5¼	D	M-S-P	2	4	5¼ x 7¼	150-352	600-1200	O	....	A-E	....	S	...	...	...	.....
38F5¼	D	M-S-P	2	5	5¼ x 7¼	188-440	600-1200	O	....	A-E	....	S	...	...	...	.....
38F5¼	D	M-S-P	2	6	5¼ x 7¼	225-792	600-1200	O	....	A-E	T	S	...	...	...	.....
38F5¼	D	M-S-P	2	7	5¼ x 7¼	263-616	600-1200	O	....	A-E	....	S	...	...	...	.....
38F5¼	D	M-S-P	2	8	5¼ x 7¼	300-1056	600-1200	O	....	A-E	T	S	...	...	...	.....
38F5¼	D	M-S-P	2	10	5¼ x 7¼	375-1320	600-1200	O	....	A-E	T	F	...	...	...	.....
38D8¼	D	M-S-P	2	4	8¼ x 10	400-800	450-900	O	....	A	....	D	...	...	...	.....
38D8¼	D	M-S-P	2	5	8¼ x 10	500-1000	450-900	O	....	A	....	D	...	...	...	.....
38D8¼	D	M-S-P	2	6	8¼ x 10	600-1800	450-900	O	....	A	T	D	...	...	...	.....
38D8¼	D	M-S-P	2	8	8¼ x 10	800-2400	450-900	O	....	A	T	D	...	...	...	.....
38D8¼	D	M-S-P	2	10	8¼ x 10	1000-3000	450-900	O	....	A	T	D	...	...	...	.....
38D8¼	D	M-S-P	2	12	8¼ x 10	1200-3600	450-900	O	....	A	T	D	...	...	...	.....
45C3½	A	S	4	1	3½ x 4	5½	1800	D	....	H-E	....	....	...	...	...	.....
45C4½	A	S	4	1	4½ x 4½	10½	1800	D	....	H-E	....	....	...	...	...	.....
45C4½-2	A	M-S	4	2	4½ x 5¼	32	1800	D	....	H-E	....	C-P	...	...	...	.....
48B	A	M-S-P	4	2	3½ x 4	20	1800	O	....	H-E	....	....	...	...	...	.....
48B	A	M-S-P	4	4	3½ x 4	40	1800	O	....	H-E	....	....	...	...	...	.....
48B	A	M-S-P	4	4	4½ x 5	88	1800	O	....	H-E	....	....	...	...	...	.....
49B4½	A	M-S-P	2	2	4½ x 5½	58	1800	....	....	A-E	....	....	...	...	...	.....
49B4½	A	M-S-P	2	3	4½ x 5½	90	1800	....	....	A-E	....	....	...	...	...	.....
49B4½	A	M-S-P	2	3	4½ x 5½	115	1800	....	....	A-E	T	....	...	...	...	.....
49B4½	A	M-S-P	2	4	4½ x 5½	126	1800	....	....	A-E	....	....	...	...	...	.....
49B4½	A	M-S-P	2	4	4½ x 5½	155	1800	....	....	A-E	T	....	...	...	...	.....
49B4½	A	M-S-P	2	6	4½ x 5½	180	1800	....	....	A-E	....	....	...	...	...	.....
49B4½	A	M-S-P	2	6	4½ x 5½	230	1800	....	....	A-E	T	....	...	...	...	.....
49B4½	A	M-S-P	2	8**	4½ x 5½	252	1800	....	....	A-E	....	....	...	...	...	.....
49B4½	A	M-S-P	2	8**	4½ x 5½	310	1800	....	....	A-E	T	....	...	...	...	.....
49B4½	A	M-S-P	2	12††	4½ x 5½	360	1800	....	....	A-E	....	....	...	...	...	.....
49B4½	A	M-S-P	2	12††	4½ x 5½	460	1800	....	....	A-E	T	....	...	...	...	.....

* *Continuous HP* ** *Twin 4 cylinder* †† *Twin 6 cylinder.*

(Reprinted from last year)

Ford Division, Ford Motor Co., P. O. 598, Dearborn, Michigan

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	H.P.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
X	A	M-S-P	4	4	3.94 x 4.52	48	2250	M	....	E	....	....	31	28	35	690
Y	A	M-S-P	4	6	3.94 x 4.52	77	2250	M	....	E	....	....	42	24	40	880

* *Continuous HP.*

General Motors Corporation, Cleveland Diesel Engine Division, 2160 W. 106 St., Cleveland, Ohio

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
3-268A	D	M-S	2	3	6½ x 7	150	1200	O	....	.....	....	....	61	38	...	5300
4-268A	D	M-S	2	4	6½ x 7	225	1200	O	....	.....	....	....	71	38	...	6150
6-268A	D	M-S	2	6	6½ x 7	340	1200	O	....	A-E	....	F	97	41	67**	7000
8-268A	D	M-S	2	8	6½ x 7	450	1200	O	....	A-E	....	F	117	41	67**	8600
8-498	D	M-S	2	8	8¼ x 10½	1400	800-850	O	....	A	T	F	152	64	112**	28600
12-498	D	M-S	2	12	8¼ x 10½	2100	800-850	O	....	A	T	F	193	64	112**	39000
16-498	D	M-S	2	16	8¼ x 10½	2800	800-850	O	....	A	T	F	234	66	121**	46000
8-567C	D	M-S	2	8	8½ x 10	800	800	O	....	A	....	F	138	62	112**	19500
12-567C	D	M-S	2	12	8½ x 10	1200	800	O	....	A	....	F	175	65	112**	27800
16-567C	D	M-S	2	16	8½ x 10	1600	800	O	....	A	....	F	214	62	112**	33900
16-567DMT	D	M-S	2	16	8½ x 10	2050	800	O	....	.....	....	....	214	68	...	35400

Dimensions and weights are for basic engines. * *Continuous HP.* ** *Height is over-all engine height.*

General Motors Corporation, Detroit Diesel Engine Division, 13400 W. Outer Drive, Detroit, Michigan

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.††	Width In.††	Height In.††	Weight Lb.††
2-53	A	S-P	2	2	3⅞ x 4½	33-47	1800-2000	O	....	E-Hy	M**	.....	27	26	35	770
3-53	A	M-S-P	2	3	3⅞ x 4½	58-97	2200-2800	O	....	E-Hy	M**	BW***	33	28	35	940
4-53	A	M-S-P	2	4	3⅞ x 4½	82-130	2200-2800	O	....	E-Hy	M**	BW***	39	26	35	1110
6V-53	A	M-P-S	2	6	3⅞ x 4½	125-195	2200-2800	O	....	E-Hy	M**	BW***	39	40	35	1440

(Continued on next page)

General Motors Corp., Detroit Diesel Engine Division (Continued)

2-71	A	S-P	2	2	4.25 x 5	40–67	1800–2000	O	....	E-Hy	M**	....	32	28	40	960
3-71	A	M-S-P	2	3	4.25 x 5	72–118	1800–2300	O	....	G-A-E-HY	M**	P-O	37	29	40	1525
4-71	A	M-S-P	2	4	4.25 x 5	98–167	1800–2300	O	....	G-A-E-HY	M**	P-O	43	29	42	1750
4-71E	A	P	2	4	4.25 x 5	110–167	1800–2300	O	....	E	M**	....	44	36	39	1750
6-71	A	M-S-P	2	6	4.25 x 5	147–252	1800–2300	O	....	G-A-E-HY	M**	O	54	29	43	2190
6-71E	A	M-P	2	6	4.25 x 5	163–252	1800–2300	O	....	E-HY	M**	O	55	35	49	2150
6V-71	A	M-S-P	2	6	4¼ x 5	162–252	1800–2300	O	....	E-Hy	M**	O	41	38	47	2010
8V-71	A	M-S-P	2	8	4¼ x 5	215–336	1800–2300	O	....	E-Hy	M**	O	47	39	48	2225
12V-71	A	M-S-P	2	12	4¼ x 5	324–504	1800–2300	O	....	E-Hy-A	M**	T	60	46	56	3350
16V-71	A	M-S-P	2	16	4.25 x 5	435–675	1800–2300	O	....	E	M**	S	78	45	58	4600
Twin 4-71	A	S	2	8	4.25 x 5	182–334	1800–2300	O	....	E-A-G-HY	M**	....	83	56	58	4820
Twin 6-71	A	M-S	2	12	4.25 x 5	280–504	1800–2300	O	....	E-A-G-HY	M**	O	94	56	58	5620
Twin 6-71†	A	M	2	12	4.25 x 5	295–504	1800–2300	O	....	E-HY	M**	O	129	40	62	7550
Quad 6-71	A	M-S	2	24	4.25 x 5	556–1008	1800–2300	O	....	E-A-G-HY	M**	O	181	58	69	12425
6-110	A	M-S-P	2	6	5 x 5.6	210–336	1800–2000	O	....	E-HY	M**	O	63	37	49	3260
Twin 6-110	A	S	2	12	5 x 5.6	416–618	1800–2000	O	....	E-A-G-HY	M**	....	118	66	78	11440
Twin 6-110†	A	M	2	12	5 x 5.6	440–618	1800–2000	O	....	E-HY	M**	O	145	54	72	10800

** Where a horsepower and rpm range is shown, the low end is the continuous rating and the high end is the maximum engine rating. Twin and Quads shown with continuous to "rated" spread. *** Borg Warner*
*† Tandem arrangements. ** Pressure Scavenging. †† Weights and dimensions are given for industrial ("S" & "P") units. Weights and dimensions for "Twins" and "Quads" are shown with radiators and power take-offs, (except marine). Torque converters are available with industrial models.*

General Motors Corporation, Electro-Motive Division, LaGrange, Illinois

Model	Type	Use†	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
6-567C	C	S-P	2	6	8½ x 10	560–600	720–835	O	....	E	....	....	126	65	89	15660
8-567CR	C	S-P	2	8	8½ x 10	750–975	720–835	O	....	E	....	....	142	63	89	19500
12-567C	C	S-P	2	12	8½ x 10	1125–1275	720–835	O	....	E	....	....	176	65	89	26200
16-567C	C	S-P	2	16	8½ x 10	1500–1950	720–835	O	....	E	....	....	215	65	89	34200
16-567D1	C	S-P	2	16	8½ x 10	1950–1950	835–900	O	....	E	T	....	215	63	89	31700
16-567D2	C	S-P	2	16	8½ x 10	2200	835	O	....	E	T	....	217	65	89	33500
16-567D3	C	S-P	2	16	8½ x 10	2600	835	O	....	E	T	....	217	65	89	34000
16-567D4	C	S-P	2	16	8½ x 10	2135–2275	720–900	O	....	E	T	....	217	65	89	34000

† Engines are available for Marine use through Cleveland Diesel Engine Division, General Motors Corporation.
* Continuous HP.

Gray Marine Motor Company, 710 Canton Avenue, Detroit 7, Michigan

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
4-D129	A	M	4	4	3⅛ x 3⅛	22.5-30	2000-2200	R	B	E	....	S-P-W†	45	25	28	656
4-D157	A	M	4	4	3⅝ x 4⅜	24-30	1600-1800	R	B	E	....	S-C	50	26	31	1100
4-D277	A	M	4	4	4 x 5½	50-66	2000-2200	R	B	E	....	S-C	56	26	39	1440
6-D427	A	M	4	6	4⅛ x 4⅞	110-130	2200-2400	R	B	E	....	S-C	57	28	33	1575
6-D572	A	M	4	6	4⅝ x 5½	135-150	2200-2400	R	B	E	....	S-C	70	32	42	2510
6-D802	A	M	4	6	5¼ x 5½	157-190	2000-2200	R	B	E	....	C	82	31	43	2900

*All data is for complete marine units. * Continuous—Intermittent Ratings. † W—Warner Hydraulic.*

Harnischfeger Corporation, P & H Diesel Engine Division, 500 South Main Street, Crystal Lake, Illinois

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
387H-18	A	M-S-P	2	3	4⅛ x 5½	103	1800	R	....	E	M	S-T-C	39	29	41	1380
387H-18T	A	M-S-P	2	3	4⅛ x 5½	142	1800	R	....	E	M-T	S-T-C	39	29	41	1390
487H-18	A	M-S-P	2	4	4⅛ x 5½	144	1800	R	....	E	M	S-T-C	46	29	41	1580
487H-18T	A	M-S-P	2	4	4⅛ x 5½	186	1800	R	....	E	M-T	S-T-C	46	29	41	1590
687H-18	A	M-S-P	2	6	4⅛ x 5½	205	1800	R	....	E	M	S-T-C	60	29	41	1900
687H-18T	A	M-S-P	2	6	4⅛ x 5½	260	1800	R	....	E	M-T	S-T-C	60	29	41	1960
V-463	A	M	2	4	4 x 5	115	2800	R	....	E	M	CP	35	34	35	780

*Weights shown are for "P" units. * Intermittent horsepower ratings with all accessories not corrected to sealevel. All engines have scavenging blowers. "T" are turbocharged with blower and turbo in series.*

Hercules Motors Corporation, Canton, Ohio

Model†	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.†
DD-149H**	A	M-S-P	4	3	3¾ x 4½	46	2600	R	....	E	....	....	32	21	32	550
DD-169H**	A	M-S-P	4	3	4 x 4½	52	2600	R	....	E	....	....	32	21	32	550
DD198H**	A	M-S-P	4	4	3¾ x 4½	72	2600	R-B	....	E	....	....	32	21	33	630
DD226H**	A	M-S-P	4	4	4 x 4	76	2400	R-B	....	E	....	....	32	21	33	630
D298**	A	M-S-P	4	6	3¾ x 4½	112	2800	R-B	....	E	....	....	39	22	36	785
D298HT**	A	M-S-P	4	6	3¾ x 4½	140	2800	R-B	....	E	T	....	39	22	36	830
D339**	A	M-S-P	4	6	4 x 4½	108	2200	R-B	....	E	....	....	39	22	36	785
D426***	A	S-P	4	6	4¼ x 5	145	2600	C	....	E	....	....	45	25	38	1350
D426T***	A	S-P	4	6	4¼ x 5	180	2600	C	....	E	T	....	45	28	42	1450
C2-90D	B	S-P	4	2	4 x 3½	34	3000	..	B-HM	E	....	....	26	25	30	275
CV4-180	B	S-P	4	4	4 x 3½	71	3000	..	B-HM	E	....	....	23	29	35	465
GO-149H	B	S-P	4	3	3¾ x 4½	46	2600	..	B-HM	E	....	....	32	21	32	475
GO-169H	B	S-P	4	3	3¾ x 4½	52	2600	..	B-HM	E	....	....	32	21	32	475
ZXB	B	S-P	4	4	2⅝ x 3	24	3600	..	B-HM	E	....	....	24	17	17	180
IXLB	B	S-P	4	4	3¼ x 4¼	49	3400	..	B-HM	E	....	....	27	18	20	295
GO-198A	B	S-P	4	4	3¾ x 4½	85	3200	..	B-HM	E	....	....	32	21	32	530
GO-226A	B	S-P	4	4	4 x 4½	93	3200	..	B-HM	E	....	....	32	21	32	530
QXLD	B	S-P	4	6	3⅞ x 4¼	92	3200	..	B-HM	E	....	....	36	18	21	445
JXC	B	S-P	4	6	3¾ x 4½	103	3200	..	B-HM	E	....	....	39	19	25	605
G-298	B	S-P	4	6	3¾ x 4½	128	3600	..	B-HM	E	....	....	41	22	33	685
JXD	B	S-P	4	6	4 x 4¼	112	3200	..	B-HM	E	....	....	39	19	25	605
G-339	B	S-P	4	6	4 x 4½	142	3600	..	B-HM	E	....	....	41	22	33	685
590	B	S-P	4	6	5 x 5	242	2800	..	B-HM	E	....	....	50	27	39	1275
779	B	P	4	6	5¼ x 6	255	2200	..	B	E	....	....	51	53	28	1300
6182	B	S-P	4	6	5¾ x 7	320	2300	..	B-HM	E	....	....	62	29	47	2350
2269	B	S	4	12	5¾ x 7	545	1800	..	B-HM	E	....	....	88	45	48	5400

** Maximum rated horsepower @ maximum rated speed*
*** Direct injected*
**** Turbulence chamber*
† Weights approximate, include fuel handling equipment only.

Ingersoll-Rand Company, 11 Broadway, New York 4, N. Y.

Model	Type	Use	Cycle	No. Cyl.**	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
4-JVG	E	S	4	4	8¼ x 9	120	550	..	....	A	....	....	101	70	75	18510
6-JVG	E	S	4	6	8¼ x 9	180	550	..	....	A	....	....	101	96	75	26360
8-JVG	E	S	4	8	8¼ x 9	240	550	..	....	A	....	....	101	120	75	34680
6-SVG	E	S	4	6	11¾ x 12¾	330	400	..	....	A	....	....	132	138	100	36000
8-SVG	E	S	4	8	11¾ x 12¾	440	400	..	....	A	....	....	132	177	100	47000
10-SVG	E	S	4	10	11¾ x 12¾	550	400	..	....	A	....	....	132	193	102	53000
12-SVG	E	S	4	12	11¾ x 12¾	660	400	..	....	A	....	....	132	206	102	63000

(Continued on next page)

Ingersoll-Rand Company, 11 Broadway, New York 4, N.Y. (Continued)

26-KVG	E	S	4	6	15¼ x 18	660	330	..	....	A	....	....	197	154	122	69000
36-KVG	E	S	4	6	15¼ x 18	660	330	..	....	A	....	....	197	184	122	79000
48-KVG	E	S	4	8	15¼ x 18	880	330	..	....	A	....	....	197	228	122	99000
410-KVG	E	S	4	10	15¼ x 18	1100	330	..	....	A	....	....	197	266	122	111000
412-KVG	E	S	4	12	15¼ x 18	1320	330	..	....	A	....	....	197	266	122	120000
512-KVG	E	S	4	12	15¼ x 18	1320	330	..	....	A	....	....	197	284	122	129000
26-KVS	E	S	4	6	15¼ x 18	1000	330	..	....	A	T	....	197	154	145	70000
36-KVS	E	S	4	6	15¼ x 18	1000	330	..	....	A	T	....	197	184	145	80000
48-KVS	E	S	4	8	15¼ x 18	1320	330	..	....	A	T	....	197	228	145	100000
412-KVS	E	S	4	12	15¼ x 18	2000	330	..	....	A	T	....	197	266	145	121000
512-KVS	E	S	4	12	15¼ x 18	2000	330	..	....	A	T	....	197	284	145	130000
38-KVT	E	S	4	8	16 x 22	2000	330	..	....	A	T	....	263	294	158	183000
410-KVT	E	S	4	10	16 x 22	2500	330	..	....	A	T	....	263	349	158	218000
512-KVT	E	S	4	12	16 x 22	3000	330	..	....	A	T	....	263	403	158	250000
616-KVT	E	S	4	16	16 x 22	4000	330	..	....	A	T	....	263	526	158	303000
512-KVH	E	S	4	12	16 x 22	3500	330	..	....	A	T	....	241	428	144	253000
616-KVH	E	S	4	16	16 x 22	4500	330	..	....	A	T	....	241	549	144	306000
4-SVO	A†	S	4	4	11¾ x 12¾	200	400	..	....	A	....	....	132	99	100	33700
6-SVO	A†	S	4	6	11¾ x 12¾	300	400	..	....	A	....	....	132	139	100	46400
8-SVO	A†	S	4	8	11¾ x 12¾	400	400	..	....	A	....	....	132	178	100	59900
10-SVO	A†	S	4	10	11¾ x 12¾	500	400	..	....	A	....	....	132	193	102	66300
12-SVO	A†	S	4	12	11¾ x 12¾	600	400	..	....	A	....	....	132	208	102	77800
412-KVO	A†	S	4	12	15¼ x 18	1320	330	..	....	A	....	....	197	266	122	120000
PJVG-6	B	S	4	6	8¼ x 9	220	720	..	....	A	....	....	87	58	78	9900
PJVG-8	B	S	4	8	8¼ x 9	295	720	..	....	A	....	....	103	58	78	12800
PSVG-6	B	S	4	6	11¾ x 12¾	408	514	..	....	A	....	....	121	76	101	30000
PSVG-8	B	S	4	8	11¾ x 12¾	544	514	..	....	A	....	....	150	76	101	38500
PSVG-10	B	S	4	10	11¾ x 12¾	680	514	..	....	A	....	....	178	76	103	43800
PSVG-12	B	S	4	12	11¾ x 12¾	816	514	..	....	A	....	....	205	76	103	49100
PKVG-8	B	S	4	8	15¼ x 18	880	327	..	....	A	....	....	173	96	121	70500
PKVG-10	B	S	4	10	15¼ x 18	1100	327	..	....	A	....	....	202	96	121	79000
PKVG-12	B	S	4	12	15¼ x 18	1320	327	..	....	A	....	....	229	96	121	95000
PKVG-16	B	S	4	16	15¼ x 18	1760	327	..	....	A	....	....	284	96	121	126000
PKVS-6	B	S	4	6	15¼ x 18	1000	327	..	....	A	T	....	....	....	....	.....
PKVS-12	B	S	4	12	15¼ x 18	2000	327	..	....	A	T	....	....	....	....	.....
PKVT-12	B	S	4	12	16 x 22	3300	360	..	....	A	T	....	295	155	158	189000
PKVT-16	B	S	4	16	16 x 22	4400	360	..	....	A	T	....	359	155	158	236000
PKVH-12	B	S	4	12	16 x 22	3750	360	..	....	A	T	....	346	155	167	193000
PKVH-16	B	S	4	16	16 x 22	5000	360	..	....	A	T	....	410	155	167	240000

***No. of power cylinders* **Horsepowers are continuous* *†Integrally-built diesel engine compressors*

International Harvester Company, 180 No. Michigan Avenue, Chicago 1, Illinois

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.†	Width In.†	Height In.†	Weight Lb.†
DU-66-D	A	S-P	4	2	3¼ x 4	14	2000	G	....	E	....	....	22	21	31	408
DU-74-D	A	S-P	4	2	3⅛ x 4	16	2000	G	....	E	....	....	22	21	31	410
DU-99-D	A	S-P	4	3	3¼ x 4	21	2000	G	....	E	....	....	26	24	30	520
DU-111-D	A	S-P	4	3	3⅛ x 4	22	2000	G	....	E	....	....	26	24	30	524
DU-132-D	A	S-P	4	4	3¼ x 4	35	2400	G	....	E	....	....	30	23	31	589
UD-370	A	S-P	4	4	4⅝ x 5½	90	2000	O	....	E-G	....	....	42	24	43	1600
UD-14A	A	S-P	4	4	4¾ x 6½	101	1800	O	....	E-G	....	....	47	29	47	2171
UD-236	A	S-P	4	6	3 11/16 x 3 11/16	70	2400	R	....	E	....	....	40	22	30	905
UD-282	A	S-P	4	6	3 11/16 x 4.39	90	2400	R	....	E	....	....	40	22	30	905
UD-554	A	S-P	4	6	4⅝ x 5½	134	2000	O	....	E-G	....	....	57	31	44	2190
UD-691	A	S-P	4	6	4¾ x 6½	141	1600	O	....	E-G	....	....	61	32	50	3211
UD-817	A	S-P	4	6	5½ x 6	240	2100	O	....	E	....	....	62	40	53	3300
UDT-817	A	S-P	4	6	5½ x 6	375	2100	O	....	E	T	....	62	40	57	3404
UD-1091	A	S-P	4	6	5¾ x 7	216	1500	O	....	E-G	....	....	71	33	56	4095
UDT-1091	A	S-P	4	6	5¾ x 7	265	1500	O	....	E-G	T	....	71	33	56	4180
UC-135	B	S-P	4	4	3¼ x 4½	38	2000	..	B	E	....	....	31	17	32	525
UC-221	B	S-P	4	6	3⅝ x 3 11/16	65	2400	..	B	E	....	....	42	24	31	895
UC-263	B	S-P	4	6	3⅝ x 4.39	80	2400	..	B	E	....	....	42	24	31	895
UB-220	B	S-P	4	6	3⅝ x 3 11/16	80	2800	..	B	E	....	....	41	21	34	810
UB-264	B	S-P	4	6	3 11/16 x 4½	95	2800	..	B	E	....	....	41	21	34	815
U-308	B	S-P	4	6	3 11/16 x 4½	82	2400	..	B	E	....	....	43	22	36	825
U-372	B	S-P	4	6	4⅝ x 4½	97	2200	..	B	E	....	....	48	26	38	1240
U-450	B	S-P	4	6	4⅝ x 5	118	2200	..	B	E	....	....	48	26	38	1250
U-501	B	S-P	4	6	4½ x 5¼	126	2200	..	B	E	....	....	48	26	38	1320
UR-372	B	S-P	4	6	4⅝ x 4½	118	2600	..	B	E	....	....	48	27	39	1240
UR-450	B	S-P	4	6	4⅝ x 5	125	2400	..	B	E	....	....	48	27	39	1250
UR-501	B	S-P	4	6	4½ x 5¼	129	2200	..	B	E	....	....	48	27	39	1320
U-1091	B	S-P	4	6	5¾ x 7	248	1600	..	B	E	....	....	71	32	56	3825
UV-401	B	S-P	4	8	4¼ x 3¾	142	2800	..	B	E	....	....	38	37	41	1310
UV-461	B	S-P	4	8	4½ x 4⅝	162	2600	..	B	E	....	....	38	37	41	1320
UV-549	B	S-P	4	8	4½ x 4⅝	192	2600	..	B	E	....	....	38	37	41	1350

**Intermittent HP—Horsepower shown is for complete engine without fan and radiator at sea level.* *†Dimensions and weights are from fan to back face of flywheel housing and do not include PTO or air cleaner.*

Kahlenberg Brothers Company, 1707-12th Street, Two Rivers, Wisconsin

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
AD	A	M-S	2	2	8½ x 9	30–36	400	O	....	A	....	O	...	...	...	5450
AT	A	M-S	2	3	8½ x 9	45–54	400	O	....	A	....	O-D	...	...	...	6500
AF	A	M-S	2	4	8½ x 9	60–70	400	O	....	A	....	O-D	...	...	..	8200
BD	A	M-S	2	2	10 x 10½	50–60	375	O	....	A	....	O	...	...	...	7300
BT	A	M-S	2	3	10 x 10½	90	375	O	....	A	....	O–D	...	...	...	9700
BF	A	M-S	2	4	10 x 10½	120	375	O	....	A	....	O–D	...	...	...	11980
B5	A	M-S	2	5	10 x 10½	150	375	O	....	A	....	O–D	...	...	...	15650
B6	A	M-S	2	6	10 x 10½	180	375	O	....	A	....	O–D	...	...	...	17050
CT	A	M-S	2	3	12½ x 14	150	325	O	....	A	....	O–D	...	...	...	21730
CF	A	M-S	2	4	12½ x 14	200	325	O	....	A	....	O–D	...	...	...	23900
C5	A	M-S	2	5	12½ x 14	250	325	O	....	A	....	†D	...	...	...	29000
C6	A	M-S	2	6	12½ x 14	300	325	O	....	A	....	†D	...	...	...	34000
E4	A	M-S	2	4	10½ x 16	400–532	300–400	C	....	A	T	†D	115	76	79	22000
E6	A	M-S	2	6	10½ x 16	600–800	300–400	C	....	A	T	†D	146	76	79	30000
E8	A	M-S	2	8	10½ x 16	800–1065	300–400	C	....	A	T	†D	177	76	79	38000

**Continuous HP.* *†Reduction gear optional.*

Lufkin Foundry & Machine Co., Lufkin, Texas

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
H333	B	S	2	2	5½ x 7	20–30	425–550	..	HM	E-A	....	....	59	53	52	3200
H795	B	S	2	2	7½ x 9	45–65	400–500	..	HM	E-A	....	....	76	68	60	4250
H1770	B	S	2	2	9 x 12½	60–120	200–475	..	LM	E-A	....	....	96	88	73	10000
H2165	B	S	2	2	10½ x 12½	75–145	200–475	..	LM	E-A	....	....	96	88	73	12500

**Continuous HP*

Mack Trucks Inc., 1355 W. Front St., Plainfield, New Jersey

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
END673	A	P	4	6	4⅞ x 6	170	2100	B	....	E-A	....	....	51	27	45	1917
ENDL673	A	P	4	6	4⅞ x 6	170	2100	B	....	E-A	....	....	51	27	45	1837
ENDT673	A	P	4	6	4⅞ x 6	205	2100	B	....	E-A	T	....	51	31	45	2032
ENDLT673	A	P	4	6	4⅞ x 6	205	2100	B	....	E-A	T	....	51	31	45	1962

*Continuous HP

(Repeated from last year)

Minneapolis-Moline Company, Minneapolis 1, Minnesota

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
206H-4A	B†	S-P	4	4	3⅝ x 5	21-45	800-1500	..	B-HM	E	....	....	38	21	36	900
288-4A	D	S-P	4	4	4¼ x 5	32-59	800-1400	B	B-HM	E	....	....	46	25	46	1400
403-4A	B	S-P	4	4	4⅝ x 6	52-79	800-1300	..	B-HM	E	....	....	46	25	46	1590
425A-6A	D	S-P	4	6	4¼ x 5	48-85	800-1400	B	B-HM	E	....	....	60	25	48	2100
605A-6A	D	S-P	4	6	4⅝ x 6	72-100	800-1200	B	B-HM	E	....	....	60	29	54	2500
800-6A	B†	S-P	4	6	5⅛ x 6	98-148	800-1300	..	B-HM	E	....	....	60	29	54	3125
D282-4A	A	S-P	4	4	4¼ x 5	28-46	800-1300	B	....	E	....	....	...	...	...	.....
D425-6A	A	S-P	4	6	4¼ x 5	42-77	800-1400	B	....	E	....	....	...	...	...	.....
D605-6A	A	S-P	4	6	4⅞ x 6	66-95	800-1400	B	....	E	....	....	...	...	...	.....

** Continuous HP † Type "B" engine includes gasoline, natural gas, LPG and tractor fuel.*

Murphy Diesel Company, 5317 West Burnham Street, Milwaukee, Wisconsin

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
ME4	A	P-M	4	4	5¼ x 6½	105-150	1200	O	....	E-GA	....	....	71	43	65	3800
MP-11	A	P-M	4	4	5¼ x 6½	112-155	1200	O	....	E-GA	....	....	71	43	65	3850
MP-12	A	P-M	4	4	6 x 6½	120-165	1200	O	....	E-GA	....	....	71	43	65	3850
MP-20†	C	P-M	4	6	5½ x 6½	147-200	1200	O	....	E-GA	....	....	93	43	65	4700
MP-120	A	P-M	4	6	5½ x 6½	155-210	1200	O	....	E-GA	**	....	93	43	65	4800
MP-21†	C	P-M	4	6	5¾ x 6½	160-220	1200	O	....	E-GA	....	....	93	43	65	4700
MP-22†	C	P-M	4	6	6 x 6½	176-250	1200	O	....	E-GA	....	....	93	43	65	4700
MP-121	A	P-M	4	6	5¾ x 6½	185-245	1200	O	....	E-GA	**	....	93	43	65	4800
MP-122	A	P-M	4	6	6 x 6½	205-275	1200	O	....	E-GA	**	....	93	43	65	4800
MP-24†	C	P-M	4	6	6¼ x 6½	200-280	1200	O	....	E-GA	....	....	93	43	65	4700
MP-24T	A	P-S-M	4	6	6¼ x 6½	300-400	1200	O	....	E-GA	T	....	88	43	64	5400
MP-324	A	P-M	4	6	6¼ x 6½	245-320	1400	O	....	E-GA	**	....	93	43	65	4800
MP-111	A	P-S-M	4	4	5¾ x 6½	125-170	1200	O	....	AEG	**	....	71	43	65	3850
MP-112	A	P-S-M	4	4	6 x 6½	140-190	1200	O	....	AEG	**	....	71	43	65	3850
MP-211	A	P-S-M	4	4	5¾ x 6½	120-165	1400	O	....	AEG	....	....	71	43	65	3800
MP-212	A	P-S-M	4	4	6 x 6½	130-175	1400	O	....	AEG	....	....	71	43	65	3800
MP-311	A	P-S-M	4	4	5¾ x 6½	135-185	1400	O	....	AEG	**	....	71	43	65	3850
MP-312	A	P-S-M	4	4	6 x 6½	145-195	1400	O	....	AEG	**	....	71	43	65	3850
MP-124	A	P-S-M	4	6	6¼ x 6½	225-305	1200	O	....	AEG	**	....	93	43	65	4800
MP-220†	A	P-S-M	4	6	5½ x 6½	160-215	1400	O	....	AEG	....	....	93	43	65	4700
MP-320	A	P-S-M	4	6	5½ x 6½	170-230	1400	O	....	AEG	**	....	93	43	65	4800
MP-221†	A	P-S-M	4	6	5¾ x 6½	180-235	1400	O	....	AEG	....	....	93	43	65	4700
MP-222†	A	P-S-M	4	6	6 x 6½	195-270	1400	O	....	AEG	....	....	93	43	65	4700
MP-321	A	P-S-M	4	6	5¾ x 6½	200-260	1400	O	....	AEG	**	....	93	43	65	4800
MP-224†	A	P-S-M	4	6	6¼ x 6½	220-300	1400	O	....	AEG	....	....	93	43	65	4700
MP-224T	A	P-S-M	4	6	6¼ x 6½	325-420	1400	O	....	E-GA	T	....	88	43	64	5400
MP-322	A	P-S-M	4	6	6 x 6½	220-295	1400	O	....	AEG	**	....	93	43	65	4800

All engines have open-type combustion chambers and unit injectors. Marine engines carry different model numbers, ratings, rpm, weights and dimensions. Ratings shown are with power consuming accessories and corrected to 29.92-in. & 60°F.

** Continuous—maximum HP. † When this Model No. is followed by designation "G", engine is dual-fuel and the continuous rating applies.*

*** These models are "TUBOCHARGED".*

Nordberg Manufacturing Co., Milwaukee, Wisconsin

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
4FS-1	A	S-P	4	1	4½ x 5¼	10-15	1200-1800	B	....	E-H	....	....	...	...	...	.....
4FG-1	B	S	4	1	4½ x 5¼	8-16	800-1800	..	HM	E-H	....	....	...	...	...	.....
4FS-2	A	S-P	4	2	4½ x 5¼	20-30	1200-1800	B	....	E-H	....	....	...	...	...	.....
4FG-2	B	S	4	2	4½ x 5¼	16-32	800-1800	..	HM	E-H	....	....	...	...	...	.....
4FS-3	A	S-P	4	3	4½ x 5¼	30-45	1200-1800	B	....	E-H	....	....	...	...	...	.....
4FS-3	B	S	4	3	4½ x 5¼	24-48	800-1800	..	HM	E-H	....	....	...	...	...	.....
FS-96-ISC	D	M-S	4	6	9 x 11½	640-800	720-900	S	LM	A-E	T	W	...	...	...	.....
FS-98-ISC	D	M-S	4	8	9 x 11½	850-1065	720-900	S	LM	A-E	T	W	...	...	...	.....
FS-136-HSC**	D	M-S	4	6	13½ x 16½	1610-1970	450-550	S	P	A	T	D	...	...	...	.....
FS-138-HSC**	D	M-S	4	8	13½ x 16½	2150-2625	450-550	S	P	A	T	D	...	...	...	.....
FS-1812-HSC**	D	M-S	4	12	13½ x 16½	2835-3500	450-550	S	P	A	T	D	...	...	...	.....
FS-1816-HSC**	D	M-S	4	16	13½ x 16½	3780-4650	450-550	S	P	A	T	D	...	...	...	.....
RTS-1412***†	D	S	2	12	14 x 16	2125-3200	400-450	B	P	A	....	....	...	...	...	.....
TS-215-31†	C	M-S	2	5	21½ x 31	2550-2925	240-257	B	....	A	....	D	...	...	...	.....
TS-216-31†	C	M-S	2	6	21½ x 31	3050-3500	240-257	B	....	A	....	D	...	...	...	.....
TS-217-31†	C	M-S	2	7	21½ x 31	3575-4100	240-257	B	....	A	....	D	...	...	...	.....
TS-218-31†	C	M-S	2	8	21½ x 31	4075-4675	240-257	B	....	A	....	D	...	...	...	.....
TS-219-31†	C	M-S	2	9	21½ x 31	4600-5275	240-257	B	....	A	....	D	...	...	...	.....
TS-2110-31†	C	M-S	2	10	21½ x 31	5100-5850	240-257	B	....	A	....	D	...	...	...	.....
TS-2112-31†	C	M-S	2	12	21½ x 31	6160-7025	240-257	B	....	A	....	D	...	...	...	.....
TS-296†	C	M-S	2	6	29 x 40	5670-6400	189-200	B	....	A	....	D	...	...	...	.....
TS-297†	C	M-S	2	7	29 x 40	6620-7500	189-200	B	....	A	....	D	...	...	...	.....
TS-298†	C	M-S	2	8	29 x 40	7570-8500	189-200	B	....	A	....	D	...	...	...	.....
TS-299†	C	M-S	2	9	29 x 40	8500-9600	189-200	B	....	A	....	D	...	...	...	.....
TS-2910†	C	M-S	2	10	29 x 40	9450-10600	189-200	B	....	A	....	D	...	...	...	.....
TS-2912†	C	M-S	2	12	29 x 40	11350-12800	189-200	B	....	A	....	D	...	...	...	.....

**Engines are designed to operate continuously at ratings shown and are good for 10 per cent overload for 2 hr in any 24 hr period.*
*** Supairthermal execution *** Radial Engine † Supercharged ratings are approximately 40% higher.*

Oliver Corporation, 300 Lawler St., Charles City, Iowa

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
Super 166D	A	S-M-P	4	4	3½ x 3¾	24.6	1800	B	....	E	....	**	39	22	38	712
Super 177D	A	S-M-P	4	6	3½ x 3¾	38.4	1800	B	....	E	....	**	48	22	38	863
Super 188D	A	S-M-P	4	6	3¾ x 4	48.0	1800	B	....	E	....	**	50	26	58	1032
Super 199D	A	S-M-P	4	6	4 x 4	57.0	1800	B	....	E	....	**	50	26	58	1100
Super 166HC	B	S-P	4	4	3½ x 3¾	24.6	1800	..	B-HM	E	....	**	39	22	38	705
Super 177HC	B	S-P	4	6	3½ x 3¾	38.4	1800	..	B-HM	E	....	**	48	22	38	779
Super 188HC	B	S-P	4	6	3¾ x 4	48	1800	..	B-HM	E	....	**	50	26	58	1048
Super 199HC	B	S-P	4	6	4 x 4	57.	1800	..	B-HM	E	....	**	51	26	58	1165

** Continuous HP. ** Reverse Gear Available.*

Roth Corporation—Lorain Engines, Lorain, Ohio

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
L	B	S	2	1	7½ x 8	27	600	..	HM	H-G	....	....	72	50	48	2810
LD	A	S	2	1	7½ x 8	23	600	S	....	G	....	....	72	50	48	2810
O	B	S	2	1	9½ x 10	42	500	..	HM	H-G	....	....	88	60	51	4300
OD	A	S	2	1	9½ x 10	34	500	S	....	G	....	....	88	60	51	4300
R	B	S	2	1	12 x 13	60	350	..	HM	G	....	....	112	71	66	8000
A	B	S	2	1	13 x 13	70	350	..	HM	G	....	....	112	72	66	8300
AD	A	S	2	1	13 x 13	55	350	S	....	G	....	....	112	72	66	8500

* *Continuous HP*

R. H. Sheppard Company, Inc., Hanover, Pennsylvania

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
17B	A	M-S-P	4	2	3½ x 4	25	1800	O	....	E	....	P	25	18	26	435
17D	A	M-S-P	4	2	3⅞ x 4	30	1800	O	....	E	....	P	25	18	26	435
19B	A	M-S-P	4	4	3½ x 4	50	1800	O	....	E	....	P	39	18	26	600
19D	A	M-S-P	4	4	3⅞ x 4	67	1800	O	....	E	....	P	39	18	26	600
16B	A	M-S-P	4	4	4½ x 5	88	1800	O	....	E	....	P	47	22	46	1600

**Maximum HP*

Sterling Engine Company, Inc., Menominee, Michigan

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
VD-6	A	M-S	4	6	8 x 9	420	1200	B-S	....	A-E	....	....	95	40	64	8500
VD-6-S	A	M-S	4	6	8 x 9	750	1200	B	....	A-E	T	....	115	40	64	9160
VD-8-S	A	S	4	8	8 x 9	1000	1200	B	....	A-E	T	....	136	40	64	12450
LC-6	B	S	4	6	5¼ x 6	72–110	800–2000	..	B	E	....	....	57	33	42	2200
TC-6	B	S	4	6	8 x 9	260–450	700–1200	..	B	A-E	....	....	101	45	64	6900
TC-8	B	S	4	8	8 x 9	365–600	700–1200	..	B	A-E	....	....	122	45	64	9000

Weights and dimensions are given for "S" units. **Horsepower listings indicate continuous and intermittent ratings.*

Union Diesel Engine Company, Oakland 6, Calif.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
GA6	D	M-S	4	6	8½ x 11	150–250	450–600	O	....	A	....	D	114	34	72	12500
GA6S	D	M-S	4	6	8½ x 11	225–375	450–600	O	....	A	T	D	117	34	72	13500
L6	D	M-S	4	6	10 x 14	210–380	360–514	O	....	A	....	D	135	42	85	20000
L6S	D	M-S	4	6	10 x 14	315–570	360–514	O	....	A	T	D	135	42	85	21000
P6	D	M-S	4	6	12 x 15	290–575	327–514	O	....	A	....	D	162	46	93	34500
P6S	D	M-S	4	6	12 x 15	440–875	327–514	O	....	A	T	D	166	46	93	36000
V6	D	M-S	4	6	14 x 19	400–780	277–400	O	....	A	....	D	185	57	114	53000
V6S	D	M-S	4	6	14 x 19	640–1150	277–400	O	....	A	T	D	185	57	114	54500
Z6	D	M-S	4	6	16 x 20½	520–1015	240–360	O	....	A	....	D	203	62	125	80000
Z6S	D	M-S	4	6	16 x 20½	780–1500	240–360	O	....	A	T	D	203	62	125	82000
GA8	D	M-S	4	8	8½ x 11	200–335	450–600	O	....	A	....	D	144	34	72	16000
GA8S	D	M-S	4	8	8½ x 11	295–500	450–600	O	....	A	T	D	151	34	72	17000
L8	D	M-S	4	8	10 x 14	280–500	360–514	O	....	A	....	D	171	42	85	26000
L8S	D	M-S	4	8	10 x 14	420–750	360–514	O	....	A	T	D	171	42	85	26500
P8	D	M-S	4	8	12 x 15	390–775	327–514	O	....	A	....	D	198	46	93	45000
P8S	D	M-S	4	8	12 x 15	590–1165	327–514	O	....	A	T	D	202	46	93	46500
V8	D	M-S	4	8	14 x 19	565–1035	277–400	O	....	A	....	D	234	57	114	70000
V8S	D	M-S	4	8	14 x 19	860–1550	277–400	O	....	A	T	D	234	57	114	72000
Z8	D	M-S	4	8	16 x 20½	695–1320	240–360	O	....	A	....	D	259	62	125	98000
Z8S	D	M-S	4	8	16 x 20½	1040–2000	240–360	O	....	A	T	D	259	62	125	100000

**Continuous HP*

Waukesha Motor Company, Waukesha, Wisconsin

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	H P.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
ICK	B	S-P	4	4	2½ x 3¼	14	2000	..	B-HM	H-E	....	....	22	13	21	195
FC	B	S-P	4	4	3¼ x 4	26	1800	..	B-HM	H-E	....	....	28	19	21	290
180GKB	B	S-P	4	4	3½ x 3¼	48	2400	..	B-HM	H-E	....	....	31	19	28	450
180DLC	A	S-P	4	4	3½ x 3¾	31†	2000	B-R	....	H-E	....	....	31	19	28	475
XAH	B	S-P	4	4	3½ x 4½	35	1800	..	B-HM	H-E	....	....	33	19	27	385
185GLB	B	S-P	4	6	3½ x 3¾	50	2000	..	B-HM	H-E	....	....	31	22	30	675
185DLC	A	S-P	4	6	3½ x 3¾	44	2000	B-R	....	H-E	....	....	31	22	30	675
190GLB	B	S-P	4	6	3¾ x 4	60	2000	..	B-HM	H-E	....	....	43	22	30	690
190DLCA	A	S-P	4	6	3¾ x 4	58†	2000	B-R	....	H-E	....	....	43	22	29	768
195GL	B	S-P	4	6	4 x 4	65	2000	..	B-HM	H-E	....	....	43	22	30	775
195DLCA	A	S-P	4	6	4 x 4	67†	2000	B-R	....	E	....	....	43	26	30	865
197-DLCS	A	M-S-P	4	6	4 x 4	94	2200	R	....	H-E	T	....	44	26	40	890
195GK	B	S-P	4	6	4¼ x 4	71	2000	..	B-HM	H-E	....	....	44	22	30	780
195-GKA	B	S-P	4	6	4½ x 4	73†	2000	..	B-HM	H-E	....	....	44	22	30	800
135DKB	A	S-P-M	4	6	4¾ x 5	99†	2000	G-B-R	....	E	....	....	48	26	35	1386
135DKBS	A	S-P-M	4	6	4¾ x 5	121†	2000	G-B-R	....	E	T	....	48	26	41	1486
135G-Z	B	S-P	4	6	4½ x 5	104	2000	..	B-HM	E	....	....	48	26	38	1325
140-GZ	B	S-P	4	6	4½ x 5½	117	1800	..	B-HM	E	....	....	25	26	43	1390
148DKB	A	S-P-M	4	6	5¼ x 6	147†	1800	B	....	E-G	....	....	56	29	47	2320
148DKBS	A	S-P-M	4	6	5¼ x 6	194†	1800	B	....	E-G	T	....	56	29	56	2445
145GZ	B	S-P	4	6	5¼ x 6	167	1800	..	B-HM	E-G	....	....	56	29	47	1820
WAKC	B	S-P	4	6	6¼ x 6½	227	1600	..	B-HM-LM	E-G-A	....	....	67	33	51	3150
WAKD	A	S-P-M	4	6	6¼ x 6½	195	1600	B	....	E-G-A	....	....	67	33	51	3800
WAKDS	A	S-P-M	4	6	6¼ x 6½	259	1600	B	....	E-G-A	T	....	67	33	63	3925
NKRB	B	S-P	4	6	7 x 8¼	260	1200	..	HM-LM	G-A	....	....	79	48	61	6900
NKD	A	S-P-M	4	6	7 x 8¼	238	1200	B	....	G-A	....	....	79	48	61	9285
NKDS	A	S-P-M	4	6	7 x 8¼	312	1200	B	....	G-A	T	....	79	48	61	9435
LRORB	B	S-P	4	6	8½ x 8½	372	1200	..	HM-LM	G-A	....	....	98	49	70	9940
LRD	A	S-P-M	4	6	8½ x 8½	332	1200	B	....	G-A	....	....	98	49	70	10800
LRDCS	A	S-P-M	4	6	8½ x 8½	556	1200	B	....	G-A	T	....	114	49	70	10450
LRZB	B	S-P	4	6	9½ x 8½	475	1200	..	HM-LM	G-A	....	....	114	60	73	11250
VLROB	B	S-P	4	12	8½ x 8½	720	1200	..	LM	G-A	....	....	130	60	58	15000
VLRD	A	S-P-M	4	12	8½ x 8½	725	1200	B	....	G-A	....	....	130	60	58	15500
VLRDS	A	S-P-M	4	12	8½ x 8½	990	1200	B	....	G-A	T	....	134	60	58	16300

* *Continuous hp ratings are based on 80 per cent of maximum at speeds indicated. Gas ratings on LPG; natural gas approx. 10 per cent lower.*
† *Counter balanced crankshaft.*

Roiline

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.†††
H570	B	S-P	4	8	4⅝ x 4¼	218	2400	..	B-HM	E-A	....	....	81	40	64	2000
H884	B	S-P	4	8	5⅜ x 4⅞	300	2400	..	B-HM	E-A	....	....	88	50	74	3200
F1500	B	S-P	4	6	6¾ x 7	159	1100	..	HM††	G-A-E	....	....	115	50	84	5800
H2000	B	S	4	8	6¾ x 7	213	1100	..	HM††	G-A-E	....	....	88	52	72	5850
L3000	B	S	4	12	6¾ x 7	324	1100	..	HM††	G-A-E	....	....	111	60	84	8300
L3460	B	S	4	12	7¼ x 7	445	'200	..	HM††	G-A-E	....	....	167	66	86	12800
L4000	B	S	4	12	7.54 x 7.5	493	1200	..	HM††	G-A-E	....	....	169	66	91	12850

*Continuous HP †Distributor available. ††LM available. †††Lighter automotive units available. Weights are given for stationary units (dry).

White Diesel Engine Division, The White Motor Company, Springfield, Ohio

Superior Engines

Model	Type	Use	Cycle	No. Cyl	Bore & Stroke In.	HP*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight lb.
6G-510	B	S-P	4	6	8½ x 9	190–450	600–1200	..	HM	A-G	....	....	....	....	....	.....
6G-825	B	S-P	4	6	10 x 10½	300–500	600–900	..	HM	A-G	....	....	....	....	....	.....
6GX-510	B	S-P	4	6	8½ x 9	300–600	600–1200	..	HM	A-G	T	....	....	....	....	.....
6GX-825	B	S-P	4	6	10 x 10½	490–750	600–900	..	HM	A-G	T	....	....	....	....	.....
8G-825	B	S-P	4	8	10 x 10½	400–660	600–900	..	HM	A-G	....	....	....	....	....	.....
8GX-825	B	S-P	4	8	10 x 10½	650–1000	600–900	..	HM	A-G	T	....	....	....	....	.....
40-6	D	M-S-P	4	6	8½ x 10½	215–460	600–1100	B-S	....	A	....	....	....	....	....	.....
40-8	D	M-S-P	4	8	8½ x 10½	290–620	600–1100	B-S	....	A	....	....	....	....	....	.....
40X-6	D	M-S-P	4	6	8½ x 10½	325–800	600–1100	B-S	....	A	T	....	....	....	....	.....
40X-8	D	M-S-P	4	8	8½ x 10½	435–1025	600–1100	B-S	....	A	T	....	....	....	....	.....
40-6	D	M-S-P	4	6	9½ x 10½	300–360	600–720	B-S	....	A	....	....	....	....	....	.....
40-8	D	M-S-P	4	8	9½ x 10½	395–475	600–720	B-S	....	A	....	....	....	....	....	.....
40X-6	D	M-S-P	4	6	9½ x 10½	485–585	600–720	B-S	....	A	T	....	....	....	....	.....
40X-8	D	M-S-P	4	8	9½ x 10½	645–775	600–720	B-S	....	A	T	....	....	....	....	.....
60-6	D	M-S	4	6	12 x 15	370–620	360–600	B	....	A	....	....	....	....	....	.....
60-8	D	M-S	4	8	12 x 15	495–700	360–514	B	....	A	....	....	....	....	....	.....
60X-6	D	M-S	4	6	12 x 15	700–1160	360–600	S	....	A	T	....	....	....	....	.....
60X-2	D	M-S	4	8	12 x 15	960–1320	360–514	S	....	A	T	....	....	....	....	.....
65-6	D	M-S	4	6	12¾ x 15	580–720	500–600	S	....	A	....	....	....	....	....	.....
65-8	D	M-S	4	8	12¾ x 15	775–960	500–600	S	....	A	....	....	....	....	....	.....
65X-6	D	M-S	4	6	12¾ x 15	1105–1600	500–600	S	....	A	T	....	....	....	....	.....
65X-8	D	M-S	4	8	12¾ x 15	1470–2150	500–600	S	....	A	T	....	....	....	....	.....
80-6	D	M-S	4	6	14½ x 20	600–850	300–375	S	HM	A	....	....	....	....	....	.....
80-8	D	M-S	4	8	14½ x 20	800–1150	300–375	S	HM	A	....	....	....	....	....	.....
80X-6	D	M-S	4	6	14½ x 20	900–1525	300–375	S	....	A	T	....	....	....	....	.....
80X-8	D	M-S	4	8	14½ x 20	1200–2000	300–375	S	....	A	T	....	....	....	....	.....

* Continuous HP

Atlas Engines

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
35-6	A	M-S-P	4	6	6½ x 8¼	150–225	900–1250	B	....	A-E	....	....	....	....	....	.....
35X-6	A	M-S-P	4	6	6½ x 8¼	225–340	900–1250	B	....	A-E	T	....	....	....	....	.....
45-6	A	M-S-P	4	6	9 x 10½	240–300	600–750	B-S	....	A	....	....	....	....	....	.....
45-8	A	M-S-P	4	8	9 x 10½	320–400	600–750	B-S	....	A	....	....	....	....	....	.....
45X-6	A	M-S-P	4	6	9 x 10½	360–450	600–750	B-S	....	A	T	....	....	....	....	.....
45X-8	A	M-S-P	4	8	9 x 10½	480–600	600–750	B-S	....	A	T	....	....	....	....	.....
76-6	A	S	4	6	13 x 16	450–500	360–400	B	....	A	....	....	....	....	....	.....
76X-6	A	S	4	6	13 x 16	675–750	360–400	B	....	A	T	....	....	....	....	.....

* Continuous HP

Witte Engine Works, Oil Well Supply Division, U. S. Steel Corporation, Kansas City 26, Missouri

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
AD	A	S-P	4	1	3¼ x 4½	4–5 5	1200–1500	B	....	H-E	....	....	24	24	33	450
BD-8	A	S-P	4	1	4¼ x 6	8	900	B	....	H-E	....	....	45	39	42	1151
BD-9	A	S-P	4	1	4¼ x 6	9	1000	B	....	H-E	....	....	45	39	42	1150
CD–12½	A	S-P	4	1	5 x 8	12.5	750	B	....	H-E	....	....	53	49	49	1735
CD-14	A	S-P	4	1	5 x 8	14	800	B	....	H-E	....	....	53	49	49	1735
F-28	B	S-P	4	1	8 x 8	28	650	..	HM	E-G	....	....	62	53	54	3000
B-12	B	S-P	4	1	5 x 6	12	1000	..	HM	H-E	....	....	47	39	42	1235
C-15	B	S-P	4	1	6 x 8	15	750	....	HM	H-E	....	....	57	47	49	1760
C-19	B	S-P	4	1	6 x 8	19	750	....	HM	H-E	....	....	57	47	49	1760
98	B	S-P	4	1	5 x 5	10	1200	..	HM	H-E	....	....	39	36	36	655
100	A	M-S-P	4	2	4 x 4	18.0	1800	B-R	....	E	....	....	29	39	26	700
F-42	B	S-P	4	1	8¼ x 8	42	750	....	HM	E-G	....	....	62	53	54	3000

*Continuous HP

Worthington Corporation, Harrison, New Jersey

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
SLHP-4	B	S-P	4	4	11½ x 12	440	514	..	....	A	T	....	....	....	....	.....
SLHP-5	B	S-P	4	5	11½ x 12	550	514	..	....	A	T	....	....	....	....	.....
SLHP-6	B	S-P	4	6	11½ x 12	660	514	..	....	A	T	....	....	....	....	.....
SLHP-7	B	S-P	4	7	11½ x 12	770	514	..	....	A	T	....	....	....	....	.....
SLHP-8	B	S-P	4	8	11½ x 12	880	514	..	....	A	T	....	....	....	....	.....
SLHP-10	B	S-P	4	10	11½ x 12	1100	514	..	....	A	T	....	....	....	....	.....
SDR5	D	S	4	5	13¼ x 17½	1030	450	..	....	A	T	....	....	....	....	.....
SDR6	D	S	4	6	13¼ x 17½	1235	450	..	....	A	T	....	....	....	....	.....
SDR7	D	S	4	7	13¼ x 17½	1440	450	..	....	A	T	....	....	....	....	.....
SDR8	D	S	4	8	13¼ x 17½	1645	450	..	....	A	T	....	....	....	....	.....
SEH5	D	S	4	5	16 x 20	1375	360	..	....	A	T	....	....	....	....	.....
SEH6	D	S	4	6	16 x 20	1650	360	..	....	A	T	....	....	....	....	.....
SEH7	D	S	4	7	16 x 20	1925	360	..	....	A	T	....	....	....	....	.....
SEH8	D	S	4	8	16 x 20	2200	360	..	....	A	T	....	....	....	....	.....
SW14-6	D	S	4	6	14 x 18	1875–2155	450–514	..	....	A	T	....	....	....	....	.....
SW14-8	D	S	4	8	14 x 18	2500–2875	450–514	..	....	A	T	....	....	....	....	.....
SW14-12	D	S	4	12	14 x 18	3750–4315	450–514	..	....	A	T	....	....	....	....	.....
SW14-16	D	S	4	16	14 x 18	5000–5755	450–514	..	....	A	T	....	....	....	....	.....
SLHC-4	E	S-P	4	4	11½ x 12	375	450	..	LM	A	T	....	....	....	....	.....
SLHC-5	E	S-P	4	5	11½ x 12	475	450	..	LM	A	T	....	....	....	....	.....
SLHC-6	E	S-P	4	6	11½ x 12	550	450	..	LM	A	T	....	....	....	....	.....
SLHC-7	E	S-P	4	7	11½ x 12	660	450	..	LM	A	T	....	....	....	....	.....
SLHC-8	E	S-P	4	8	11½ x 12	750	450	..	LM	A	T	....	....	....	....	.....
SLHC-10	E	S-P	4	10	11½ x 12	950	450	..	LM	A	T	....	....	....	....	.....
SUTC-5	E	S	2	5	16 x 16	1250	300	..	P	A	T	....	....	....	....	.....
SUTC-6	E	S	2	6	16 x 16	1500	300	..	P	A	T	....	....	....	....	.....
SUTC-7	E	S	2	7	16 x 16	1750	300	..	P	A	T	....	....	....	....	.....
SUTC-8	E	S	2	8	16 x 16	2000	300	..	P	A	T	....	....	....	....	.....
SUTC-10	E	S	2	10	16 x 16	2500	300	..	P	A	T	....	....	....	....	.....

* Continuous HP. Increased horsepower is available on some models. Minor variations of bores and strokes can be made for special applications.

Imported Diesels

Foreign engines listed are limited to those of manufacturers with active sales representation in this country.

Burmeister & Wain American Corporation, Mystic, Conn.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.†	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
20MT-30	A	S	4	2-6	7.9 x 11.8	35	600	O	....	A	....	....	...	...	...	.....
20MTB-30	A	S	4	3-6	7.9 x 11.8	50	600	O	....	A	T	....	...	...	...	.....
25MT-40	A	S	4	2-7	9.8 x 15.7	60	500	O	....	A	....	....	...	...	...	.....
25MTB-40	A	S	4	3-7	9.8 x 15.7	85	500	O	....	A	T	....	...	...	...	.....
33MT-48	A	M-S	4	3-7	13.0 x 18.9	105	400	O	....	A	....	D	...	...	...	.....
28V-50	A	M-S	2	4-9	11.0 x 19.7	122	360	O	....	A	....	D	...	...	...	.....
33MTB-48	A	M-S	4	3-7	13.0 x 18.9	140	400	O	....	A	T	D	...	...	...	.....
26MTB-40	A	S	4	4-8	10.3 x 15.7	165	600	O	...	A	T	....	...	...	...	.....
28VB-50	A	M-S	2	5-9	11.0 x 19.7	175	360	O	....	A	T	D	...	...	...	.....
35V-62	A	M-S	2	4-10	13.8 x 24.4	200	300	O	....	A	....	D	...	...	...	.....
42V-75	A	M-S	2	4-10	16.5 x 29.5	280	240	O	....	A	....	D	...	...	...	.....
35VB-62	A	M-S	2	5-10	13.8 x 24.4	280	300	O	....	A	T	D	...	...	...	.....
42VB-75	A	M-S	2	5-10	16.5 x 29.5	390	240	O	....	A	T	D	...	...	...	.....
50V-90	A	M-S	2	4-10	19.7 x 35.4	410	200	O	....	A	....	D	...	...	...	.....
50VT-110	A	M-S	2	4-10	19.7 x 43.3	420	170	O	....	A	....	D	...	...	...	.....
50VB-90	A	M-S	2	5-10	19.7 x 35.4	555	200	O	....	A	T	D	...	...	...	.....
50VTB-110	A	M-S	2	5-10	19.7 x 43.3	580	170	O	....	A	T	D	...	...	...	.....
50VT-110/40	A	M-S	2	4-10	19.7 x 43.3/15.7	585	170	O	....	A	....	D	...	...	...	.....
62V-115	A	M-S	2	4-10	24.4 x 45.3	600	150	O	....	A	....	D	...	...	...	.....
62VT-115	A	M-S	2	4-10	24.4 x 45.3	600	150	O	....	A	....	D	...	...	...	.....
62VT-140	A	M-S	2	4-12	24.4 x 55.1	555	135	O	....	A	....	D	...	...	...	.....
62VB-115	A	M-S	2	5-10	24.4 x 45.3	820	150	O	....	A	T	D	...	...	...	.....
62VTB-115	A	M-S	2	5-10	24.4 x 45.3	820	150	O	....	A	T	D	...	...	...	.....
74VT-140	A	M-S	2	4-10	29.1 x 55.1	875	125	O	....	A	....	D	...	...	...	.....
62VTB-140	A	M-S	2	5-12	24.4 x 55.1	1090	135	O	....	A	T	D	...	...	...	.....
74VT-160	A	M-S	2	5-12	29.1 x 63.0	920	115	O	....	A	....	D	...	...	...	.....
74VTB-140	A	M-S	2	5-12	29.1 x 55.1	1180	125	O	....	A	T	D	...	...	...	.....
75VT-150/50	A	M-S	2	4-10	29.5 x 59.0/19.7	1230	120	O	....	A	....	D	...	...	...	.....
74VTB-160	A	M-S	2	5-12	29.1 x 63.0	1500	115	O	....	A	T	D	...	...	...	.....
75VT-170/60	A	M-S	2	4-10	29.5 x 66.9/23.6	1300	110	O	....	A	....	D	...	...	...	.....
75VTB-150/50	A	M-S	2	4-10	29.5 x 59.0/19.7	1650	120	O	....	A	T	D	...	...	...	.....
84-VTB-180	A	M-S	2	5-12	33 x 70.8	2100	110	O	....	A	T	D	...	...	...	.....
ALPHA-340	A	M	2	2-4	7.9 x 13.4	50	450	O	....	A	....	††	...	...	...	.....
ALPHA-400	A	M	2	2-6	9.1 x 15.7	70	375	O	....	A	....	††	...	...	...	.....
ALPHA-490	A	M	2	4-8	11½ x 19¼	120	310	O	....	A	....	D††	...	...	...	.....
BUKH-EV80	A	M-S-P	4	1	3.1 x 4.3	7	1800	B	....	E-H**	....	....	...	...	...	.....
BUKH-EV100	A	M-S-P	4	1-3	3.9 x 5.1	12	1800	B	....	E-H**	....	††	...	...	...	.....

† *Horsepower continuous per cylinder.* ** *Also cartridge start.* †† *Controllable pitch propeller and sailing clutch of own manufacture. On models with dual stroke, shorter stroke is for exhaust piston.*

Daimler-Benz of N.A., Inc., Industrial Div., 126-56 Northern Blvd., Flushing 68, L. I., New York

Mercedes-Benz

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
MB851	A	M-S-P	4	1	4.5 x 5.5	20	2000	G	....	E	....	....	20	23	35	607
MB861†	A	M-S-P	4	1	4.5 x 5.5	20	2000	G	....	E	....	....	22	25	34	607
MB852	A	M-S-P	4	2	4.5 x 5.5	40	2000	G	....	E	....	....	27	23	35	915
MB862†	A	M-S-P	4	2	4.5 x 5.5	40	2000	G	....	E	....	....	29	26	34	915
M204B	A	M-S-P	4	4	5.5 x 8.25	120	1200	G	....	A-E	....	....	55	31	53	2710
OM636	A	M-S-P	4	4	2.938 x 3.938	35	3000	G	....	E	....	P	30	21	30	355
OM312	A	M-S-P	4	6	3.563 x 4.75	77–100	2400–3000	G	....	E	....	C-S	37	27	40	785
OM321	A	M-S-P	4	6	3.75 x 4.75	94–110	2600–3000	G	....	E	....	C-S	37	27	40	785
OM315	A	M-S-P	4	6	4.438 x 5.5	124–145	1800–2100	G	....	E	....	C-S	54	31	45	1700
OM326	A	M-S-P	4	6	5 x 5.5	155–172	1800–2200	G	....	E	....	C-S	55	31	46	1655

(Continued on next page)

Daimler-Benz of N.A., Inc., (Continued)

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
MB846A	A	M-S-P	4	6	5.875 x 7.5	250	1500	G	....	A-E	....	....	71	30	56	3860
MB846Ab	A	M-S-P	4	6	5.875 x 7.5	320	1500	G	....	A-E	T	....	86	31	58	4080
MB836B	A	M-S-P	4	6	6.875 x 8.063	375	1500	G	....	A-E††	....	....	83	42	61	4190
MB836Bb	A	M-S-P	4	6	6.875 x 8.063	525	1500	G	....	A-E††	T	....	88	42	66	4630
MB836Db	A	M-S-P	4	6	6.875 x 8.063	650	1500	G	....	A-E††	T**	....	92	44	66	5050
MB820B	A	M-S-P	4	V-12	6.875 x 8.063	750	1500	G	....	A-E††	....	....	93	54	61	5780
MB820Bb	A	M-S-P	4	V-12	6.875 x 8.063	1100	1500	G	....	A-E††	T	....	93	54	77	6530
MB820Db	A	M-S-P	4	V-12	6.875 x 8.063	1350	1500	G	....	A-E††	T**	....	93	55	79	6680
MB518B	A	M	4	V-20	7.3 x 9.8	3000	1720	G	....	A	M	D†††	158	62	89	10585
MB837A	A	M-S-P	4	V-8	6.5 x 6.891	440	2000	G	....	E	....	....	47	41	38	2760
MB837Aa	A	M-S-P	4	V-8	6.5 x 6.891	550	2000	G	....	E	M	....	50	41	44	2865

** Horsepower rating given are intermittant, marine, at 29.92 in. HG, 80°F intake air temperature and 60% relative humidity. Industrial at 60°F air intake temperature. Where HP range is given, the higher hp is maximum rating for automotive applications. ** Highly turbocharged with aftercooler. † Air cooled. ††Uses compressed air motor starting. †††Engine direct reversible.*

DAF of Holland, Inc., P. O. Box 690, Stamford, Conn.
Van Doorne's Automobielfabriek N. V., Eindhoven, Holland

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
DA475	A	M-S-P	4	6	3.96 x 3.94	100	2500	C	....	E	....	**	41	30	30	1000
DD575	A	M-S-P	4	6	3.96 x 4.75	120	2400	C	....	E	....	**	44	30	33	1150
DS575	A	M-S-P	4	6	3.96 x 4.75	165	2400	C	....	E	T	**	44	30	41	1200

**Maximum horsepower **As requested*

Henschel-Werke GmbH, Kassel, Germany (Norca Machinery Corp., 350 - 5th Ave., New York, N. Y.)

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
4R1013†	A	M-S-P	4	4	3.94 x 5.12	66–90	2200–2600	G	....	E	....	....	34	25	38	725
4R1013A†	A	M-S-P	4	4	3.94 x 5.12	75–100	2200–2600	G	....	E	M	....	37	26	40	815
6R1013	A	M-S-P	4	6	3.94 x 5.12	96–125	2200–2500	G	....	E	....	....	44	25	42	1040
6U1013**	A	M-S-P	4	6	3.94 x 5.12	96–125	2200–2500	G	....	E	....	....	50	50	18	1080
6R1013A	A	M-S-P	4	6	3.94 x 5.12	110–150	2200–2500	G	....	E	M	....	47	25	43	1140
6U1013A**	A	M-S-P	4	6	3.94 x 5.12	110–150	2000–2500	G	....	E	M	....	50	55	20	1180
6R1115	A	M-S-P	4	6	4.34 x 5.90	114–145	2000–2200	G	....	E	....	....	53	33	44	1330
6U1115**	A	M-S-P	4	6	4.53 x 5.90	124–158	2000–2200	G	....	E	....	....	52	49	21	1450
6R1215D	A	M-S-P	4	6	4.92 x 5.90	143–180	1800–2000	G	....	E	....	....	53	28	43	1590
6R1416	A	M-S-P	4	6	5.31 x 6.1	160–200	1600–1800	G	....	A-E	....	....	59	32	49	2430
6U1416**	A	M-S-P	4	6	5.31 x 6.1	160–200	1600–1800	G	....	E	....	....	69	51	29	2430
6R1416A	A	M-S-P	4	6	5.31 x 6.1	212–285	1600–1800	G	....	A-E	T	....	73	32	49	2520
6U1416A**	A	M-S-P	4	6	5.31 x 6.1	212–285	1600–1800	G	....	E	T	....	76	51	29	2520
8V1416	A	M-S-P	4	8	5.31 x 6.1	213–265	1600–1800	G	....	A-E	....	....	53	42	49	3100
8V1416A	A	M-S-P	4	8	5.31 x 6.1	283–380	1600–1800	G	....	A-E	T	....	67	42	49	3210
12V1416	A	M-S-P	4	12	5.31 x 6.1	320–400	1600–1800	G	....	A-E	....	....	70	42	49	4520
12V1416A	A	M-S-P	4	12	5.31 x 6.1	424–570	1600–1800	G	....	A-E	T	....	84	42	49	4680

** Continuous-maximum HP. ** Underfloor flat engine. † This model can be obtained as underfloor flat engine.*

Nissho Pacific Corp., 649 So. Olive St., Los Angeles 14, Calif.
Isuzu Engines

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.*	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
DL200	A	M-S-P	4	4	3.11 x 4.02	52	3600	G	....	E	....	....	29	22	30	419
DA220	A	M-S	4	4	3.94 x 5.12	75	2600	G	....	E	....	....	35	28	42	838
DA120	A	M-S-P	4	6	3.94 x 5.12	125	2600	G	....	E	....	....	45	27	42	1025
DA120T	A	M-S-P	4	6	3.94 x 5.12	160	2600	G	....	E	T	....	45	32	43	1074
DA640	A	M-S-P	4	6	4.02 x 5.12	130	2600	G	....	E	....	....	46	29	43	1025
DH100	A	M-S-P	4	6	4.73 x 5.91	190	2300	G	....	E	....	....	57	30	46	1808
DH100S	A	M-S-P	4	6	4.73 x 5.91	230	2300	G	....	E	T	....	57	33	41	1850

Kloeckner-Humboldt-Deutz—Diesel Energy Corporation 82 Beaver Street, New York 5, N. Y.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel† System	Ignition	Start	Supercharge	Rev. Gear	Length In.††	Width In.††	Height In.††	Weight Lb.††
MAH711	A	M-S-P	4	1	3 15/16 x 4 1/2	6	1500	O	....	H	....	....	31	24	21	374
MAH914	A	M-S-P	4	1	4 1/2 x 5 1/2	11	1500	O	....	H	....	....	39	30	26	693
MAH916	A	S-P	4	1	4 1/2 x 6 1/2	16	1300	O	....	H-A	....	....	44	35	28	957
MAH820	A	S-P	4	1	6 1/2 x 7 1/2	20	1000	O	....	H-A	....	....	55	39	32	1717
F1-6L712	A**	M-S-P	4	1-4 & 6	3 1/2 x 4 1/2	10–90	2000–2800	O-B	....	H-E	....	....	49	28	34	902
A2-6L514	A**	M-S-P	4	2-4 & 6	4 1/2 x 5 1/2	32–84	1800	B	....	H-E	....	....	64	34	40	1606
A6L614	A**	S-P	4	V-6	4 1/2 x 5 1/2	84	1800	B	....	E	....	....	39	46	35	1672
A8L614	A**	M-S-P	4	V-8	4 1/2 x 5 1/2	112	1800	B	....	E	....	....	47	47	35	1981
A12L614	A**	M-S-P	4	V-12	4 1/2 x 5 1/2	170	1800	B	....	E	....	....	67	48	35	2862
A6L714	A	M-S	4	V-6	4 1/2 x 5 1/2	125***	2000	B	....	A-E	....	....	42	48	40	1739
A8L714	A	M-S	4	V-8	4 1/2 x 5 1/2	168***	2000	B	....	A-E	....	....	48	48	40	2058
A12L714	A	M-S	4	V-12	4 1/2 x 5 1/2	250***	2000	B	....	A-E	....	....	66	48	35	2972
F6L714	A	P	4	V-6	4 1/2 x 5 1/2	145***	2300	B	....	A-E	....	....	42	48	40	1684
F8L714	A	P	4	V-8	4 1/2 x 5 1/2	195***	2300	B	....	A-E	....	....	48	48	40	1992
F12L714	A	P	4	V-12	4 1/2 x 5 1/2	200***	2300	B	....	A-E	....	....	66	48	35	2972
F3M716	A	M-S-P	4	3	5 1/16 x 6 5/16	90–100	1800–2000	B	....	E	....	....	37	30	41	1380
F4M716	A	M-S-P	4	4	5 1/16 x 6 5/16	120–133	1800–2000	B	....	E	....	....	45	30	46	1670
F6M716	A	M-S-P	4	6	5 1/16 x 6 5/16	180–200	1800–2000	B	....	E-A	....	....	60	30	46	2240
BF6M716	A	M-S-P	4	6	5 1/16 x 6 5/16	230	1800	B	....	E-A	T	....	65	32	47	2420
F12M716	A	M-S-P	4	12	5 1/16 x 6 5/16	360–400	1800–2000	B	....	E-A	....	....	70	52	39	3960
BF12M716	A	M-S-P	4	12	5 1/16 x 6 5/16	460	1800	B	....	E-A	T	....	83	52	51	4400
A2-8M517	A	M-S-P	4	2, 4, 6 & 8	5 1/16 x 6 1/4	42–170	1500	B	....	E	....	....	130	30	48	3192
BA8M517	A	M-S-P	4	8	5 1/16 x 6 1/4	250	1500	B	....	E-A	T	....	130	30	51	3501
T8M420	A	M-S-P	2	V-8	6 1/16 x 7 1/16	400	1200	O	....	E	....	....	80	48	61	4780
T12M420	A	M-S-P	2	V-12	6 1/16 x 7 1/16	600	1200	O	....	A	....	....	99	48	63	6495
BT8M420	A	M-S-P	2	8	6 1/16 x 7 1/16	560	1200	O	....	E-A	T	....	78	49	78	5500

(Continued on next page)

Kloeckner-Humboldt-Deutz—(Continued)

BT12M420	A	M-S-P	2	12	6⅛ x 7¾	840	1200	O	....	E-A	T	....	102	49	78	7266
A4-8M428	D	M-S-P	4	4, 6 & 8	8½ x 11	150–810	600	O	....	A	....	D	130	36	65	14467
A3&4M528	D	M-S-P	4	3 & 4	8½ x 11	110–150	600	O	....	A	....	D	82	56	75	8808
A6&8M528	D	M-S-P	4	6 & 8	8½ x 11	290–370	750	O	....	A	....	D	139	52	75	14758
BA6&8M528	D	M-S-P	4	6 & 8	8½ x 11	465–620	750	O	....	A	T	D	155	52	96	15414
V6&8M536	D	M-S-P	4	6 & 8	10⅝ x 14½	450 & 510	514	O	....	A	....	D	164	43	83	27525
V6&8M545	D	M-S-P	4	6 & 8	13 x 17¾	550 & 660	375	O	....	A	....	D	196	53	94	44040
BV6&8M536	D	M-S-P	4	6 & 8	10⅝ x 14½	750 & 900	514	O	....	A	T	D	170	43	103	28515
BV6&8M545	D	M-S-P	4	6 & 8	13 x 17¾	1000 & 1320	380	O	....	A	T	D	201	53	128	43709
BV12M350	D	M-S	4	12	15¾ x 19¾	3200	375	O	....	A	T	D	250	110	138	118000
V6&8M358	D	M-S-P	4	6 & 8	15¾ x 22⅞	810–1090	300	O	....	A	....	D	248	45	127	86979
BV6&8M358	D	M-S-P	4	6 & 8	15¾ x 22⅞	1600–2160	300–320	O	....	A	T	D	248	79	127	86318
V6&8M366	D	M-S-P	4	6 & 8	16½ x 26	915–1210	275	O	....	A	....	D	300	72	142	118027
BV6&8M366	D	M-S-P	4	6 & 8	16½ x 26	1500 & 2000	275	O	....	A	T	D	276	72	169	119568

** Continuous HP † B Denotes Robert Bosch Equipment. †† Where range of engines is shown, weights and dimensions are for largest engine in range. In most cases, width and height are the same for all engines in the range. ** Air Cooled. *** Engine running at 2000 rpm; HP intermittent. Engine running at 2300 rpm; HP automotive.*

Lister-Blackstone, Inc., 42-32 21st Street, Long Island City 1, N. Y.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
LD1	A	M-S	4	1	3 x 3½	3.5	1800	C	....	H-E	....	O	22	19	25	245
LD2	A	M-S	4	2	3 x 3½	7	1800	C	....	H-E	....	O	28	21	28	406
SL1	A	M-S	4	1	3⅛ x 3½	4¼	1800	C	....	H-E	....	O	22	20	25	245
SL2	A	M-S	4	2	3⅛ x 3½	8½	1800	C	....	H-E	....	O	28	20	28	406
SL3	A	M-S	4	3	3⅛ x 3½	12¾	1800	C	....	H-E	....	O	33	20	28	470
SL4	A	M-S	4	4	3⅛ x 3½	17	1800	C	....	E	....	O	41	25	25	640
HA2	A	M-S	4	2	4 x 4½	22	1800	C	....	H-E	....	O	38	26	36	620
HA3	A	M-S	4	3	4 x 4½	33	1800	C	....	H-E	....	O	43	26	36	830
HB2	A	M-S	4	2	4 x 4½	24	2000	C	....	H-E	....	O	38	26	36	604
HB3	A	M-S	4	3	4 x 4½	36	2000	C	....	H-E	....	O	43	26	36	848
HA6	A	M-S	4	6	4 x 4½	66	1800	C	....	E	....	O	44	28	39	1240
HB6	A	M-S	4	6	4 x 4½	72	2000	C	....	E	....	O	44	28	39	1240
3½/1	A	S-P	4	1	3¾ x 5½	3.5	650	C	....	H	....	....	36	24	47	737
6/1	A	S-P	4	1	4½ x 5½	6	650	C	....	H	....	....	36	24	47	692
8/1	A	S-P	4	1	4½ x 5½	8	850	C	....	H	....	....	36	24	47	778
VA	A	S-P	4	1	4½ x 5½	7.5	850	C	....	H	....	....	35½	25½	39½	756
12/2	A	S-P	4	2	4½ x 5½	12	650	C	....	H	....	....	51	24	44	1040
16/2	A	S-P	4	2	4½ x 5½	16	850	C	....	H	....	....	51	24	47	1100
JP2	A	M-S	4	2	4½ x 5½	23	1200	C	....	H-E-A	....	O	55	29	42	2034
JP3	A	M-S	4	3	4½ x 5½	35	1200	C	....	H-E-A	....	O	64	29	42	2496
JP4	A	M-S	4	4	4½ x 5½	46	1200	C	....	H-E-A	....	O	88	38	42	3024
JP616	A	M-S	4	6	4½ x 5½	70	1200	C	....	E-A	....	O	93	34	44	3752
FR1	A	M-S	4	1	3¾ x 4½	8–9	1500–1800	C	....	H-E	....	O	25	23	36	795
FR2	A	M-S	4	2	3¾ x 4½	16–18	1500–1800	C	....	H-E	....	O	30	23	36	977
FR3	A	M-S	4	3	3¾ x 4½	24–27	1500–1800	C	....	H-E	....	O	35	23	36	1164
FR4	A	M-S	4	4	3¾ x 4½	32–36	1500–1800	C	....	H-E	....	O	44	23	36	1370
FR6	A	M-S	4	6	3¾ x 4½	48–54	1500–1800	C	....	H-E	....	O	54	23	36	1660
TS3	A	M-S	2	3	3¼ x 4¼ †	80	1800	C	....	E	....	O	65	31	29	1330

** BHP quoted is for 12 hour continuous running with 10% overload for 1 hour. † TS3 is a horizontal opposed-piston engine. Multiply stroke per cylinder by 2 to obtain total piston travel.*

Maschinenfabrik-Augsburg-Nuernberg A. C., American M◆A◆N Corp., 500-Fifth Ave., New York 36, N. Y.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.	Fuel System	Ignition	Start	Supercharge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
D0022M	A†	M-S-P	4	2	3.94 x 4.92	17–25	1200–1800	G	....	A-E	....	....	24	29	37	770
D0024M	A†	M-S-P	4	4	3.94 x 4.92	34–57	1200–2200	G	....	A-E	....	....	36	32	37	1080
D0026M	A†	M-S-P	4	6	3.94 x 4.92	49–87	1200–2200	G	....	A-E	....	....	44	27	48	1180
D1246M	A†	M-S-P	4	6	4.41 x 5.51	71–108	1200–2000	G	....	A-E	....	....	47	28	45	1520
D1548M	A†	M-S-P	4	8	4.53 x 5.51	104–160	1200–2000	G	....	A-E	....	....	45	47	49	2000
D1548MT	A†	M-S-P	4	8	4.53 x 5.51	145–180	1500–2000	G	....	A-E	T	....	45	56	53	2400
RV16/18	A	M-S-P	4	6 & 8	6.30 x 7.09	150–320	1000–1500	G	....	A-E	....	....	....	....	....	.....
RV16/18T	A	M-S-P	4	6 & 8	6.30 x 7.09	230–500	1000–1500	G	....	A-E	T	....	....	....	....	.....
WV17.5/22A	D	M-S-P	4	3-6, 8	6.89 x 8.66	64–320	600–1200	G	....	A-E	....	....	44-98	32	53-57	.....
WV17.5/22AmA	A	M-S-P	4	6 & 8	6.89 x 8.66	220–460	600–1200	G	....	A-E	T	....	93&115	32	55&63	.....
WV22/30	A	M-S-P	4	6 & 8	8.66 x 11.81	250–580	600–1000	G	....	A-E	....	....	98&122	30	74	.....
WV22/30mA	A	M-S-P	4	6 & 8	8.66 x 11.81	395–1040	600–1000	G	....	A-E	T	....	98&122	30	75&78	.....
RV30/38T	A	M-S-P	4	6, 8, 10	11.8 x 14.96	805–2200	500–700	G	....	A-E	T	....	....	....	....	.....
VV16/18	A	M-S-P	4	12	6.3 x 7	300–480	1000–1500	G	....	A-E	....	....	....	....	....	.....
VV16/18T	A	M-S-P	4	12	6.3 x 7	460–750	1000–1500	G	....	A-E	T	....	....	....	....	.....
VV22/30	A	M-S-P	4	12 & 16	8.66 x 11.81	500–1160	600–1000	G	....	A-E	....	....	....	....	....	.....
VV22/30mA	A	M-S-P	4	12 & 16	8.66 x 11.81	790–2080	600–1000	G	....	A-E	T	....	....	....	....	.....
VV30/45	A	M-S-P	4	12,14,16,18	11.8 x 17.7	700–1680	250–428	G	....	A	....	....	....	....	....	.....
VV30/45T	A	M-S-P	4	12,14,16,18	11.8 x 17.7	950–2670	250–428	O	....	A	T	....	....	....	....	.....
LV18/21	A	M-S-P	4	12	7.1 x 8.27	390–700	1000–1500	G	....	A-E	....	....	81	54	70	8000
LV18/21mA	A	M-S-P	4	12	7.1 x 8.27	570–1250	1000–1500	G	....	A-E	T	....	86	54	81	8600
GV23.5/33	D	M-S	4	3-8	9.25 x 12.99	100–440	360–600	O	....	A	....	D	....	....	....	.....
GV23.5/33mA	D	M-S	4	5-8	9.25 x 12.99	255–685	360–600	O	....	A	T	D	....	....	....	.....
GV30/45	D	M-S	4	3-9	11.81 x 17.71	175–840	250–428	O	....	A	....	D	....	....	....	.....
GV30/45mA	D	M-S	4	5-9	11.81 x 17.71	395–1425	250–428	O	....	A	T	D	....	....	....	.....
GV40/60	D	M-S	4	6-10	15.75 x 23.62	640–1430	225–300	O	....	A	....	D	....	....	....	.....
GV40/60mA	D	M-S	4	6-10	15.75 x 23.62	1020–2500	225–300	O	....	A	T	D	....	....	....	.....
GV52/74	D	M-S	4	6-10	20.47 x 29.13	1110–2500	188–250	O	....	A	....	D	....	....	....	.....
GV52/74mA	D	M-S	4	6-10	20.47 x 29.13	1770–4000	188–250	O	....	A	T	D	....	....	....	.....
KV45/66	A††	M-S	4	6-8	17.71 x 25.98	1800–3730	214–250	O	....	A	T***	D	....	....	....	.....
GZ52/70	A††	M-S	2	5-10	20.47 x 27.56	1620–4250	187–250	O	....	A	....	D	....	....	....	.....
GZ52/90	A††	M-S	2	5-10	20.47 x 35.43	1385–4100	125–187	O	....	A	....	D	....	....	....	.....
KZ57/80	A††	M-S	2	5-10,12	22.44 x 31.50	2200–6360	187–225	O	....	A	....	D	....	....	....	.....
KZ57/80C	A††	M-S	2	6-10,12	22.44 x 31.50	3300–8000	187–225	O	....	A	T	D	....	....	....	.....
KZ60/105	A††	M-S	2	5-10,12	23.62 x 41.34	2160–6800	125–167	O	....	A	....	D	....	....	....	.....
KZ60/105C	A††	M-S	2	6-10,12	23.62 x 41.34	3370–8840	125–167	O	....	A	T	D	....	....	....	.....
KZ70/120	A††	M-S	2	5-10	27.56 x 47.24	2940–7000	110–130	O	....	A	....	D	....	....	....	.....
KZ70/120C	A††	M-S	2	6-10	27.56 x 47.24	4590–9050	110–130	O	....	A	T	D	....	....	....	.....
KZ70/120D	A††	M-S	2	6-10	27.56 x 47.24	5490–9800	110–130	O	....	A	T	D	....	....	....	.....
KZ78/140	A††	M-S	2	6-10	30.70 x 55.10	4680–9200	100–118	O	....	A	....	D	....	....	....	.....
KZ78/140D	A††	M-S	2	6-10	30.70 x 55.10	6570–12450	100–118	O	....	A	T	D	....	....	....	.....
KZ78/155	A††	M-S	2	6-10,12	30.70 x 61.02	6930–18000	95–115	O	....	A	T	D	....	....	....	.....
KZ84/160	A††	M-S	2	6,8-10,12	33.07 x 62.99	8430–21600	95–115	O	....	A	T	D	....	....	....	.....
DZ53/80	A**	M-S	2	4-10	20.87 x 31.50	2855–8100	188–214	O	....	A	....	D	....	....	....	.....
DZ60/110	A**	M-S	2	5-10	23.62 x 43.31	3510–8550	105–130	O	....	A	....	D	....	....	....	.....
DZ72/120	A**	M-S	2	5-10	28.34 x 47.24	5000–12450	95–120	O	....	A	....	D	....	....	....	.....

** Continuous HP. *** Highly Turbocharged. ** Double acting. † "Whisper" Engine, multi-fuel use (With MAN Patented Silent Combustion Principle) †† Cross head.*

Napier Engines Inc., Subsidiary of D. Napier & Son, Ltd., 909 Dupont Circle Bldg., Washington 6, D.C.

Model†	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.††	HP.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
5-25B&C	A	M-S-P	2	9	5½ x 7¼	860	1500	..	....	A	....	O	76	44	90	6900
9-26K	A	M	2	9	5½ x 7¼	825	1500	..	....	A	....	O	101	44	90	9300
T9-29	A	S-P	2	9	5½ x 7¼	1150	1600	..	....	A	T	....	86	44	90	7500
18-25C	A	S-P	2	18	5½ x 7¼	1725	1500	..	....	A	....	....	101	44	90	10500
18-25K&39K	A	M	2	18	5½ x 7¼	1650–1875	1500–1700	..	....	A	....	O	127	44	90	13300
T18-27C	A	S-P	2	18	5½ x 7¼	2300	1600	..	....	A	T	....	122	44	90	10800
T18-27K&37K	A	M	2	18	5½ x 7¼	2100–2400	1600–1800	..	....	A	T	O	153	44	90	13700

* *Continuous HP* † *All models are of the "Deltic" 2-cycle opposed piston design.* †† *Multiply stroke by 2 because of opposed piston design.*

Hawker Siddeley Brush, Inc., 34-14 58th St., Woodside 77, L. I., N. Y.

Petters, Ltd.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev.†† Gear	Length In.	Width In.	Height In.	Weight Lb.
PA41	A	S-P	4	1	3 x 3	1.875–3.75*1000/1800		BR†	....	H	....	....	29	20	29	273
AVA1	A	S-P	4	1	3.15 x 4.33	3.75–7.5* 1000/1800		BR†	....	H-E	....	....	30	23	33	412
AVA2	A	S-P	4	2	3.15 x 4.33	7.5–15.0*1000/1800		BR†	....	H-E	....	....	37	23	34	558
PH1	A	S-P	4	1	4.4375 x 4.33	4.8–9.75*1000/2000		BR†	....	H-E	....	....	30	23	33	415
PH2	A	S-P	4	2	4.4375 x 4.33	9.6–19.5*1000/2000		BR†	....	H-E	....	....	37	23	34	563
PC1	A	S-P	4	1	3 x 3	4.5–6.25*2000/3000		BR†	....	H-E	....	....	28	17	28	243
PC2	A	S-P	4	2	3 x 3	8.1–12.5*2000/3000		BR†	....	H-E	....	....	25	23	31	329
PC3	A	S-P	4	3	3 x 3	12.2–18.75*2000/3000		BR†	....	E	....	....	24	23	31	439
PC4	A	S-P	4	4	3 x 3	16.25–25* 2000/3000		BR†	....	E	....	....	28	23	31	503
AV1	A	S-P	4	1	3.15 x 4.33	3.75–7.5* 1000/1800		BR†	....	H-E	....	....	30	21	33	390
AV2	A	S-P	4	2	3.15 x 4.33	7.5–15* 1000/1800		BR†	....	H-E	....	....	37	21	34	545
PHW1	A	S-P	4	1	4.4375 x 4.33	4.8–9.75*1000/2000		BR†	....	H-E	....	....	30	21	33	393
PHW2	A	S-P	4	2	4.4375 x 4.33	9.6–19.5*1000/2000		BR†	....	H-E	....	....	37	21	34	551
PD2	A	M-S-P	4	2	4.5 x 4.33	11–24** 1200/1800		BR†	....	H-E-HY	....	PAR	34	28	36	1020
PD3	A	M-S-P	4	3	4.5 x 4.33	24–36** 1200/1800		BR†	....	H-E-HY	....	PAR	40	28	36	1160
PD4	A	M-S-P	4	4	4.5 x 4.33	36–52** 1200/1800		BR†	....	H-E-HY	....	PAR	46	28	39	1330
PDV6	A	M-S-P	4	6	4.5 x 4.33	54–78** 1200/1800		BR†	....	E-HY	....	PAR	41	49	34	1680
PDV8	A	M-S-P	4	8	4.5 x 4.33	72–104**1200/1800		BR†	....	E-HY	....	S.C.	49	49	34	1990
B2	A	M-S-P	4	2	4.33 x 4.33	13–20** 1000/1500		BR†	....	H-E-HY	....	PAR	47	23	40	987
B3	A	M-S-P	4	3	4.33 x 4.33	20–36** 1000/1800		BR†	....	H-E-HY	....	PAR	55	23	40	1211
B4	A	M-S-P	4	4	4.33 x 4.33	26–48** 1000/1800		BR†	....	H-E-HY	....	PAR	62	23	43	1478
AVA1M	A	M	4	1	3.15 x 4.33	5–6** 1500/1800		BR†	....	H-E	....	BMC	37	22	27	575
AVA2M	A	M	4	2	3.15 x 4.33	10–12** 1500/1800		BR†	....	H-E	....	BMC	44	22	27	721
PH1M	A	M	4	1	4.4375 x 4.33	6.25–7.5**1500/1800		BR†	....	H-E	....	BMC	37	22	27	579
PH2M	A	M	4	2	4.4375 x 4.33	12.5–15** 1500/1800		BR†	....	H-E	....	BMC	44	22	27	726
PC2M	A	M	4	2	3 x 3	10** 3000		BR†	....	H	....	BMC	40	23	33	522
PC3M	A	M	4	3	3 x 3	15** 3000		BR†	....	E	....	BMC	45	23	33	655
PC4M	A	M	4	4	3 x 3	20** 3000		BR†	....	E	....	BMC	49	23	33	719
AV1M	A	M	4	1	3.15 x 4.33	5–6** 1500/1800		BR†	....	H-E	....	BMC	37	22	27	580
AV2M	A	M	4	2	3.15 x 4.33	10–12** 1500/1800		BR†	....	H-E	....	BMC	44	22	27	761
PHW1M	A	M	4	1	4.4375 x 4.33	6.25–7.5**1500/1800		BR†	....	H-E	....	BMC	37	22	27	580
PHW2M	A	M	4	2	4.4375 x 4.33	12.5–15** 1500/1800		BR†	....	H-E	....	BMC	44	22	27	761
ASM1	A	S-P	4	1	4.25 x 4.25	6–11** 1000/1800		C	....	H-E	....	....	28	25	34	510
ASM2	A	S-P	4	2	4.25 x 4.25	14–22** 1000/1800		C	....	H-E	....	....	35	24	37	700
ASM3	A	S-P	4	3	4.25 x 4.25	20–33** 1000/1800		C	....	H-E	....	....	43	27	39	970

* *Maximum or rated.* ** *Continuous.* † *Bryce.* †† *PAR-Parsons. BMC-British Motor Corp. S.C. Self-changing gears. OPT—optional*

Mirrlees, Bickerton & Day, Ltd., Hazel Grove, Stockport, England

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
TL**	A	M-S-P	4	3-6	8⅛ x 13¾	135/432	500/650	BR†	....	A-E	T	OPT.	...	...	...	.....
J	A	M-S-P	4	3-16	9¾ x 10½	141/2272	500/900	BR†	....	A-E	T	OPT.	...	...	...	.....
JL	A	M-S-P	4	3-8	9¾ x 12½	168/1048	500/750	BR†	....	A-E	T	OPT.	...	...	...	.....
K	C	M-S	4	3-16	15 x 18	291/4440	300/450	BR†	....	A	T	OPT.	...	...	...	.....
AL	A	M	4	6-10	19 x 27	1600/4340	200/300	BR†	....	A	T	OPT.	...	...	...	.....

* *Continuous* † *Bryce* ** *6-cyl model has 13-in. Stroke* *Opt = Optional* *Notes on National & Mirrlees Engines—ratings given at N.P.T. for operation on diesel fuel. Models R4A, F, J, JL, K, AL available naturally-aspirated or turbocharged with or without aftercoolers. Model TL available naturally-aspirated or turbocharged, no after coolers.*

National Gas & Oil Engine Co., Ltd., Ashton-Under-Lyne, England

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
R4A	D	M-S-P	4	3-8	9 x 12	165/864	600/750	BR†	....	A-E	T	OPT.	...	...	...	.....
F	D	M-S	4	3-8	12 x 15	285/1372	500/600	BR	....	A-E**	T	OPT.	...	...	...	.....
B4A	D	M-S	4	5-8	17 x 21½	830-2400	333-375	BR	....	A	T	OPT.	...	...	...	.....

* *Continuous* † *Bryce* *OPT—Optional* ** *Electric starting available on 3 and 4-cyl models only.*

Sulzer Bros., Inc., New York, 50 Church Street, New York 7, N. Y.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
TA24	..	M	2	6 & 8	9.45 x 15.75	630/840	400	O	....	A	T	O-D	180/211	59/62	72	46200/58500
TA36	..	M-S	2	4-10 & 12	14.16 x 23.7	880/2640	250	O	....	A	T	D	189/404	82/90	125/137	78300/168000
TA48	..	M-S	2	5-10 & 12	18.9 x 27.6	1875/4500	225	O	....	A	T	D	233/468	126	120	151000/318000
TAD56	..	M	2	5-8,10 & 12	22 x 39.4	2500/6000	155	O	....	A	T	D	274/547	140	156	256000/512000
SAD60	..	M	2	5-12	23.6 x 41	3200/7680	150	O	....	A	T	D	274/590	141	222	338000/725000
RD68	..	M	2	5-12	26.8 x 49.2	5500/13200	135	O	....	A	T	D	329/715	216	250	458000/1000000
RD76	..	M	2	5-12	29.9 x 61	7500/18000	119	O	....	A	T	D	368/788	191	308	697000/1515000
RD90	..	M	2	6-12	35.4 x 61	12000/24000	119	O	....	A	T	D	469/923	196	318	1098000/2064000
BA22	..	S	4	5, 6 & 8	8.65 x 12.6	350/600	600	O	....	A	T	..	....	....	....	20700/28800
BCA29	..	S	4	6 & 8	11.4 x 14.2	900/1200	500	O	....	A	T	..	....	....	....	42800/158200
LDA22	..	P	4	6	8.65 x 11.4	725	950	O	....	E	T	..	....	....	....	11566
LDA25	..	P	4	6 & 8	9.8 x 12.6	935/1250	850	O	....	E	T	..	....	....	....	16100/20700
LDA28	..	P	4	6, 8 & 12	11 x 14.2	1160/2300	750	O	....	E	T	..	....	....	....	21000/43400

**Continuous Horsepower*

Volvo Diesels, Volvo Import Inc., 452 Hudson Terrace, Englewood Cliffs, N. J.

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	Hp.*	R.P.M.	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
Penta D1	A	M-S-P	4	1	3 1/8 x 3 11/16	5.5	2000	G	....	E-H	....	O	24	19	25	285
Bolinder 1051	A	M-S-P	4	1	4 1/8 x 5 1/8	11.8	1500	G	....	E-H	....	O	40	24	36	1070
Bolinder 1052	A	M-S-P	4	2	4 1/8 x 5 1/8	26	1800	G	....	E-H	....	O	46	24	36	1325
Bolinder 1113	A	M-S-P	4	3	4 5/8 x 5 1/8	50.5	2000	G	....	E-H	....	O-C-P-S	40	25	41	1300
Bolinder 1114	A	M-S-P	4	4	4 5/8 x 5 1/8	67.5	2000	C-G	....	E-H	....	O-C-P-S	45	25	44	1640
Penta D47	A	M-S-P	4	6	3 5/8 x 4 11/16	71	2000	G	....	E	....	B-C-P-S	46	27	35	1470
Penta D67	A	M-S-P	4	6	4 1/8 x 5 1/8	87	1800	C	....	E	....	C-P-S-T	49	27	39	1765
Penta D96	A	M-S-P	4	6	4 5/8 x 5 1/2	127	1800	G	....	E	....	C-S-T	55	31	42	1985
Penta TD96	A	S-P	4	6	4 5/8 x 5 1/2	160	1800	G	....	E	T	....	55	31	42	2060
Penta TIMD96	A	M	4	6	4 5/8 x 5 1/2	185	1800	G	....	E	T†	S-T	55	31	42	2205

* *Continuous. B.S. Rating.* † *With intercooler.* *Reverse Gear—B—Borg Warner*

Continental Machinery Corporation, 19402 S. Susana Rd., Compton, Calif., P.O. Box 5309, Long Beach 5, Calif.
Yanmar Diesel Engines

Model	Type	Use	Cycle	No. Cyl.	Bore & Stroke In.	HP.*	R.P.M.*	Fuel System	Ignition	Start	Super-Charge	Rev. Gear	Length In.	Width In.	Height In.	Weight Lb.
A-2-L	A	P-S	4	1	2 3/8 x 2 5/8	3.5	3000	O	....	H	....	....	18	13	18	76
A-3-L	A	P-S	4	1	2 1/2 x 2 3/4	4.5	3000	O	....	H	....	....	18	14	20	99
NT-65-M	A	P-S	4	1	2.6 x 3.0	4	2200	O	....	H-E	....	....	22	15	17	132
NT-70-M	A	P-S	4	1	2.8 x 3.1	5	2200	O	....	H-E	....	....	23	16	18	159
NT-75-M	A	P-S	4	1	3.0 x 3.5	6	2100	O	....	H-E	....	....	25	17	20	197
NT-85-M	A	P-S	4	1	3.3 x 3.9	8	2000	O	....	H-E	....	....	27	18	21	256
NT-65-L	A	P-S	4	1	2.6 x 3.0	4	2200	O	....	H-E	....	....	22	15	18	142
NT-70-L	A	P-S	4	1	2.8 x 3.1	5	2200	O	....	H-E	....	....	23	16	20	165
NT-75-L	A	P-S	4	1	3.0 x 3.5	6	2100	O	....	H-E	....	....	25	17	22	204
NT-85-L	A	P-S	4	1	3.3 x 3.9	8	2000	O	....	H-E	....	....	27	18	23	264
NTS-70-R	A	M	4	1	2.8 x 3.1	4	2200	O	....	H-E	....	O	25	19	22	264
NTS-85-R	A	M	4	1	3.3 x 3.9	6.5	1800	O	....	H-E	....	O	34	21	19	396
ST-95	A	M	4	1	3.8 x 4.5	8	1600	O	....	H-E	....	O	24	19	24	495
2ST-95	A	M	4	2	3.8 x 4.5	16	1600	O	....	H-E	....	O	30	19	31	815

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Diesels were specified by Pan Am for jet aircraft service trucks, where reliability and dependability are paramount factors.

Jet servicing demands reliability

With diesel-powered Darts, Pan Am's jets can depend on fast ground servicing

"The thing about an airport refuelling rig is not so much the number of hours. It's day-in, day-out reliability. Any delay on our end holds fantastically expensive equipment on the ground, to say nothing of disrupting schedules. When a plane comes in, it has to be serviced —and two trucks handle everything—*right now!*"

The two refuelling rigs referred to by Pan AM's spokesman are KW-Dart trucks of 70,000-lb GVW with 55,800-lb payload. These Darts are fitted with a Cummins C160 464-cu in. diesel. Power is 160-hp @ 2500-rpm; torque is 376-lb/ft @ 1400-rpm.

Engine is adjusted to operate on the fuel it transports —Turbine Fuel 1A. To facilitate cold-weather starting, the diesel is fitted with an intake-manifold glow plug. Incidentally, one of the characteristics of the fuel—formulated for high-altitude jet aircraft—is a freeze point of –58°F.

A power take-off from the truck's transmission works through top gear (direct) of the gearbox to drive a Rupp-Gorman 600-gpm pump at between 1500 and 2100-rpm. Flow is controlled from the nozzle end of the hose, by changing engine speed. A "dead-man" cutoff shuts off flow unless held open.

Since the truck is compartmented, these trucks can service all the operating-fluid requirements of the entire aircraft. There are separate controls to pump lube oil, hydraulic fluid, etc.

The trucks are used only on the airport grounds, carrying heavy loads over short haul at low speed. Sole purpose of the trucks is jet aircraft servicing. There may be periods of inactivity. But when needed they must be ready to start, roll, and keep going until the job is done.

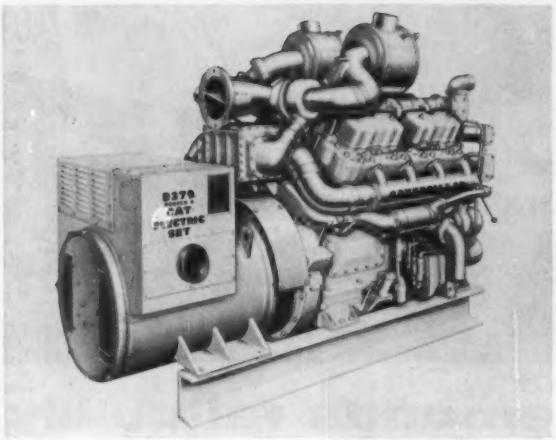
Transmission is Clark 300V five-speed box; rear axle is Eaton HR45 double-reduction-drive axle complete with drums. Brakes are Westinghouse with Cummins 12-cu ft water-cooled engine-oil-lubricated air compressor. Twin wheel front suspension is by cast-steel bogie beams with rubber-bushed ends, semi-elliptic leaf springs and ball-jointed rubber-bushed torque rods to maintain parallel tandem traction.

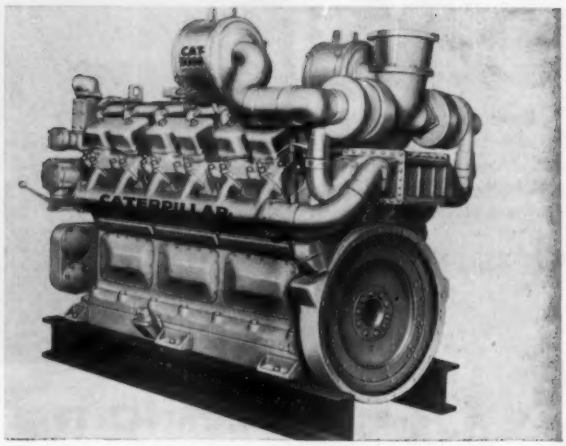
These trucks were placed in service in May, 1960. Pan AM keeps no record of hours, but approximations can be made from the operating schedules. Average refuelling trip requires 30-minutes of travel time and 35-minutes of pumping time. Five thousand miles registered on the odometer at the time of the interview. Average airport speed is, say, 10-mph.

Traveling time then calculates to 500-hrs; pumping time to 575-hrs: total time is 1075-hrs—plus idling time, which is an unknown but is substantial.

Not many hours? Well, it all depends. Over a temperature range from a wet –30° to a sizzling hundred, these trucks have to start up and go quickly. Availability and reliability to date is 100%. To Pan AM, everything else is secondary for this operation. As far as they're concerned, these two Dart trucks with their diesel engines meet their requirements.

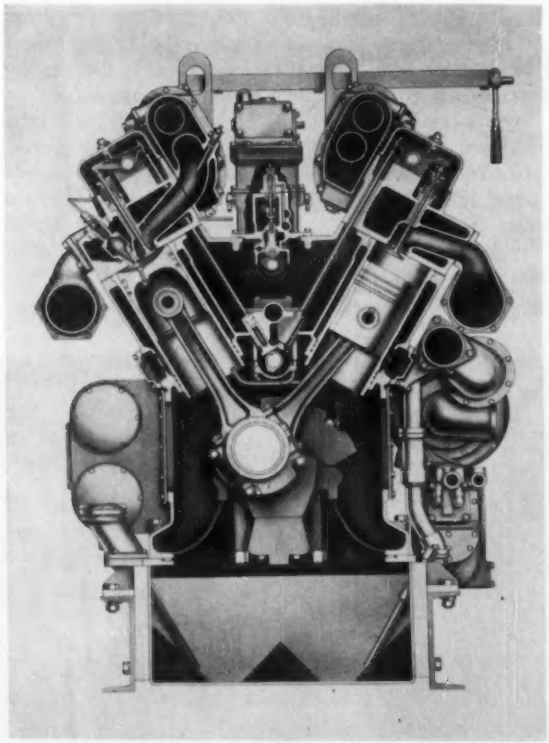
Dart trucks are compartmentalized to meet all fluid requirements of the aircraft. "Dead-man" cutoff is a safety check.





Cat Introduces the D379 and D398

New high-ouput vee-type 8- and 12-cyl models were designed with definite user benefits in mind.



General construction and arrangement of components. Unit behind sectioned fuel injection pump is governor. Bracket at top supports air cleaners; doubles as throttle control support.

CATERPILLAR started with a clean sheet of paper when they designed their new 8-cyl D379 and 12-cyl D398 diesel engines. Yet all the technology and field experience gained in their years of manufacture went into the designs.

Vee-type engines are not new to Cat . . . they had their D375 and D397 engines. These were 5¾-in. bore engines. Also they have the 6-cyl, in-line D353 engine with its 6¼-in. bore. Putting the vee concept and the 6¼-in. bore together, along with a lot of new and important ideas, the result is two attractive high-output engines.

How does an engine builder approach the problem of designing new engines? First, he must produce a package in the horsepower bracket that a group of customers need, with features that are attractive to them, and to sell at a price that they're willing to pay. Let's see how some of the design objectives established for the Caterpillar engineers fit this pattern.

Curves show the horsepower of both engines for industrial service. For this service and for generator sets, they are right in a popular power bracket. One design requirement was that the engines be as small as practicable for their output; space always seems to be at a premium. Despite their higher outputs, these engines have the same mounting dimensions and in some dimensions are smaller than their vee-type predecessors.

Other features of the design requirements included:

a. Maximum serviceability from either side.
b. Provision for changing rotation with a minimum of part replacement.
c. Location of components to anticipate customer needs and thus avoid requests for relocation.

How these features were achieved will be discussed later. Actually, bearing in mind that these are production-type engines, these items also have a favorable affect on costs. Excellent flexibility to meet individual requirements has been achieved with a minimum number of special parts.

Going further in the matter of costs, it was decided:

a. Design had to be such that existing tooling could be used.
b. Basic design had to be capable of anticipated horsepower growth.
c. Since the 6¼-in. bore was used in the D353 engine (used in the D9 tractor and as industrial and marine units), a maximum of common parts should be used.

Here is the framework on which the engineers had to build. Now let's look at some of the results.

Start with the basic structure . . .

Years back, Cat designers appeared to be little concerned with weight and size. Recently, introduction of their "compact" line, the truck engine and their almost-complete swing to turbocharged engines shows a new emphasis on reduction of specific weight and size. The newer engines are positively sleek by comparison.

In these particular engines, changes were made to lighten the block without strength reduction. It was pointed out how, in one case, movement of a cast iron section to directly under a row of head studs had increased that portion's structural strength by 30%.

Changes have been made in the block's vee. Earlier models were machined right down to the base of the vee, a complicated job. The new block has an entablature near the top (see cross section) that is easy to mill and that serves as a mounting base for the fuel injection pump and governor. Bottom of the vee is reserved for the camshaft, valve lifter brackets and the main lube oil manifold.

All this mechanism, including the fuel pump camshaft, is exposed to the oil mists in the crankcase in addition to having specific pressure lubrication. The lube oil manifold running through the valve lifter brackets has telescopic sections so that it can be disconnected to permit removal of individual lifter brackets for servicing.

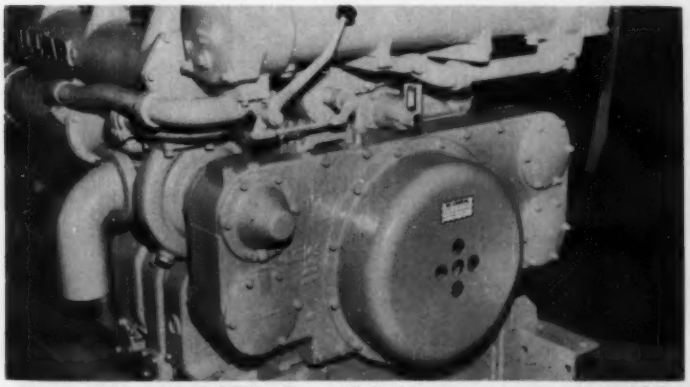
While we're in this area of the engine, note the pee-pipes extending into the liner area. Thes provide a carefully directed stream of oil against the piston to cool it and also lubricate the piston pins. This eliminates need for rifle-drilling of the rods.

D-379 and D-398 engines are being produced on a production line. Bed moves along a conveyor floor from section to section.

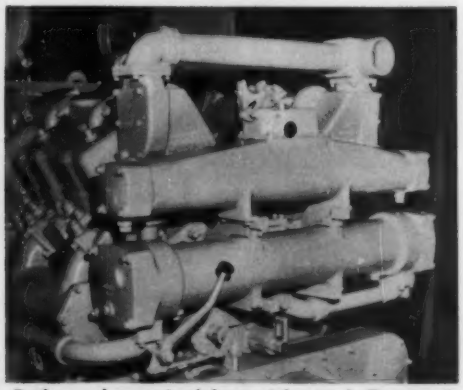
New crankshaft design . . .

In vee engines the firing order selected and the vee angle determine the crank angles. Normally, the set up works well only for only one direction of rotation. But a design requirement was to provide for counter-rotation with a minimum change of new parts. Cat engineers licked this problem by making the crank-shaft symmetrical end for end. Both ends have flanges (strong enough to permit coupling of two engines and handle twin engine output), have timing train drive gears and have thrust shoulders.

Rotational direction can be changed by turning the crankshaft end for end (both camshafts, valve and fuel pump as well) and making the other appropriate changes. The shaft itself is a forging, shot-peened and induction hardened before micro-finishing. It has bolt-on counterweights. Main and pin journals have been upped in diameter to the point where there is considerable overlap of their sections. This gives added strength at the critical fillet and web areas.



Above, gear case with PTO's. Two at left drive water pump, top, and lube pump. Oil cooler is at left. Handle is for priming pump. In right picture, lower tubular housing holds lube oil filters; one above, fuel oil filters.



Both can be serviced from either end. Top manifolding is for jacket water. Detroit Vernatherm controlled system insures a full-volume flow.

All bearings are precision-type steel-backed aluminum. One interesting feature is that clearances have been considerably reduced. Caterpillar research has demonstrated beneficial results in the area of stabilization of oil films through reduction in bearing clearances. These are now well below what was formerly considered necessary. Results are less wear and better shaft support.

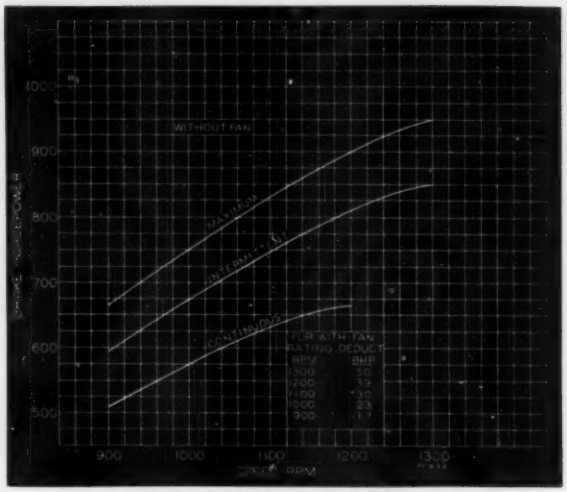
Engines are turbocharged, aftercooled . . .

Combustion air is cleaned in twin Donaldson air filters before entering the twin Schwitzer turbochargers. The flow arrangement was designed to minimize the amount of "plumbing" and also to get the minimum flow restriction.

Air leaves the turbo's compressors and enters the aftercooler (built by Modine for Cat) through long-sweep transition pieces. Each turbo's air has its own passage through the aftercooler. It then leaves in a smooth sweep to enter the intake manifold. Arrangement is such that the turbo driven by the right bank supplies air to the left bank and vice versa.

In the cylinder, Cat's familiar precombustion chamber is found. Also, the fuel injection system is essentially the same after allowing for changes in the plunger helices to provide the required amount of fuel. Pistons are the standard 6¼-in., 3-ring cam-ground type found in the D353 engine. Two chrome-faced compression rings are carried in a cast iron insert in the aluminum piston body. The oil ring is also chrome-faced and has a spring expander.

After combustion, gases enter the water-sheathed exhaust manifolds. The twin pipes in each manifold meet in a transition piece leading to the turbine scroll case and the nozzle ring. After expanding through the turbine, gases from both turbines join in a common exhaust pipe. Note the separator in the exhaust fitting. Exhaust from each turbo has its own long-sweep passage until leaving the fitting, in short, they don't "blow down each others throat."

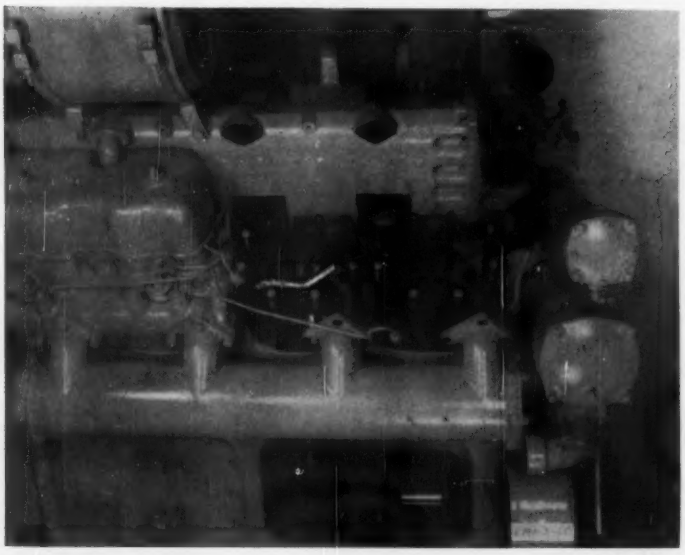


Rating curve for Cat's D-398A, shows power without fan loss.

Aftercooling has an important affect on possible ratings. The cooling effect can be obtained by jacket water (after it is cooled) or by an outside source of water. Compressor air temperature can reach as high as 400°F and the efficiency of the aftercooler is such that when using 180°-190°F jacket water, air temperature can be reduced 160°F or more.

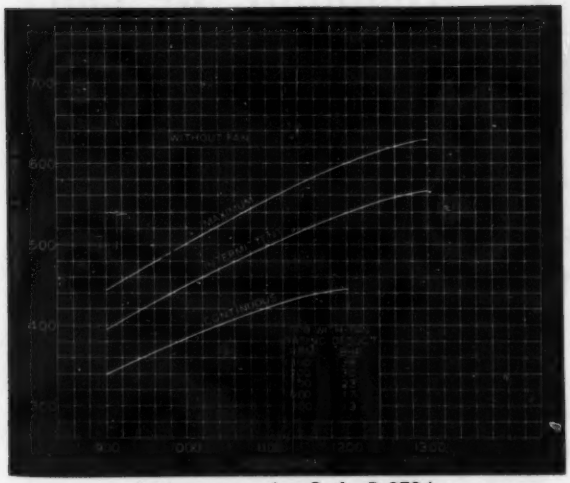
Flow of cooled jacket water is through the oil cooler and then to passages in the flywheel housing. The aftercooler is mounted on the housing such that the water has entry to it. It leaves the aftercooler and flows through distribution headers to the cylinders.

When an outside source of water is used, the aftercooler is turned on its mounting. This blanks the entry of jacket water and leaves the inlet and outlet openings exposed for the external water connections.



Cylinder head can be removed without disturbing manifolds. Piston and rod can be removed through access door.

Cat's 3-ring piston, cam-ground aluminum with cast iron insert for two compression rings. All three rings are chrome faced.



Rating curve for Cat's D-379A, with fan power loss shown in box.

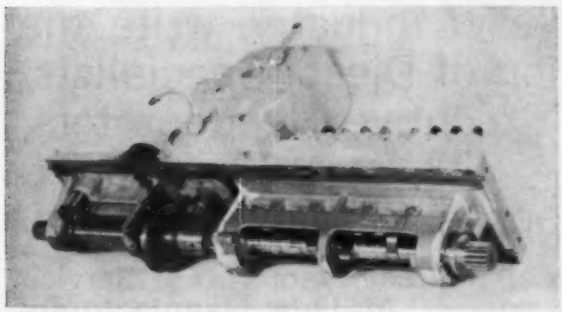
Design for flexibility, accessibility . . .

Any engine builder will tell you that two of the biggest headaches in meeting customer requirements are providing accessory location options and the right oil pans. Cat engineers set out to lick this to the greatest possible degree.

Air cleaners, turbochargers, fuel injection pump and governor, and the aftercooler are located centrally and in or above the vee where they are reasonably accessible from either side.

The filter location problem was met in a different way. Both lube oil and fuel oil filter housings are horizontally mounted across the front of the engine. Covers at both ends permit them to be serviced from either side.

The gear train housing extends across the front of the engine below the filter housings. This housing is symmetrical. Provision is made for eight power take-off locations with two in constant use, one driving the water circulating pump and the second, the lube oil pump. Of the remaining six, four are on the face and two on the rear of the case. The top power take offs, both front and rear, run at twice engine speed, the bottom ones at 1.5 to 1.



Complete fuel injection pump and governor assembly that mounts in vee. Tachometer drive is at left.

When reversing engine rotation, the gear mounting plate and the idlers are reversed. For standard rotation, the water and oil pump power take offs are driven through a single idler, the PTO's on the other side through twin idlers. Reversing the idlers provides correct rotation of the pump drives when engine rotation is reversed. The external lube oil pump, actually three in one unit, is part of the plan to build a "universal" oil pan.

Getting the lube oil pump out of the oil pan serves two main purposes. First, it is easily accessible for servicing and replacement. This includes the pressure relief valve. Second, oil pan design is not hampered by having to provide space for the pump and its drive.

The oil pan is a simple compartmented structure. Oil draining from the engine flows to a forward, center or rear sump where it is picked up by the scavenge pumps. It is then delivered to the lower (main engine) sump. Submerged suction for the pressure pump supplying the engine is therefore assured even if the engine is tilted.

Oil filler and dipstick locations are provided on both sides of the pan. Dipsticks are on both sides and it is a simple matter to put the filler tube and cap, plus the dipstick, on the side specified by the customer.

Maximum interchangeability of parts on the same engine, between the two vee engines, and all 6¼-in. bore engines, has been worked out. Ease of servicing has also been considered. For example, the interchangeable cylinder heads can be removed without disturbing intake and exhaust manifolds. To facilitate this, pads on the head and manifolds have been milled at a 4-deg angle to allow the head to be lifted out.

Still there must be some options . . .

Every installation has some special needs. Caterpillar anticipated this but tried to meet the requirements with external and easily-changed components. For example, to meet different governing needs, either of two Cat mechanical governors, one with 10% and the other with 3% regulation can be installed. For closer regulation, either isochronous or with a fixed droop, a Woodward hydraulic governor such as the PSG can be fitted.

As to starting, there's a choice of duel electric starting motors, air motor starting or gasoline engine starting.

Normal instrumentation includes an overspeed shutdown and gauges to show water temperature, oil pressure and fuel pressure. Other gauges or alarm and shutdown systems can be applied as specified. All exhaust outlets in the manifolds have drilled and tapped holes for pyrometer thermocouples. These can be installed if specified; otherwise, they are plugged. Also, stock has been left in the head to permit drilling of a passage for indicator cock installation. This, when specified, permits taking of compression and firing pressures.

These two new engines are currently being offered as industrial engines (SAE No. oo flywheel housings), as electric generator sets and as marine engines. Gas versions are not currently available but are expected at a future date. In the meantime, here are two new high-output diesels incorporating all the latest and best thinking of Caterpillar.

WHAT'S IN AN ASSOCIATION EMBLEM?

Naturally, we can't speak for every association, however, we would like to explain what the Association of Diesel Specialists' emblem means . . . both to you and to the entire diesel industry.

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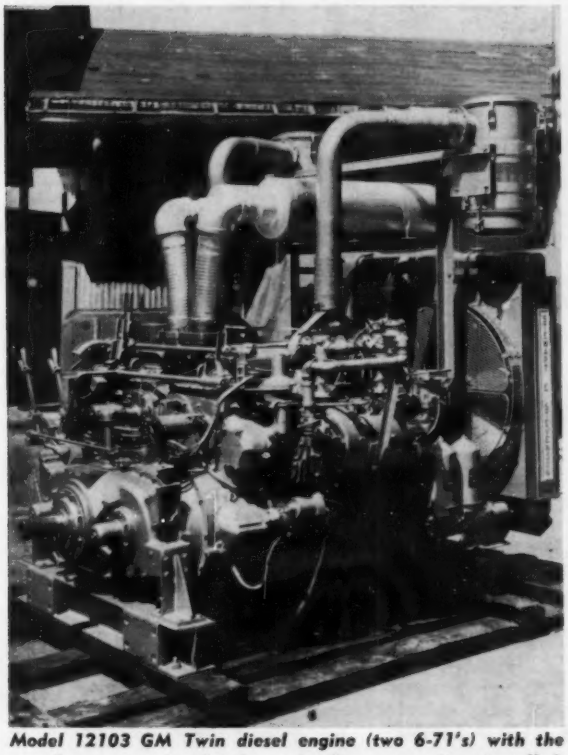
For more information write in No. 107

Converting "Jimmy" to Natural Gas



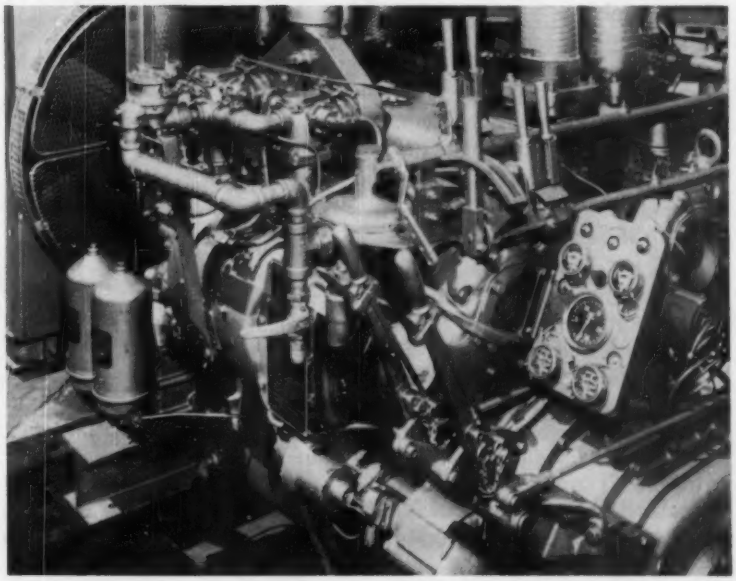
Model 12103 GM Twin diesel engine (two 6-71's) with the complete conversion kit for natural gas operation installed.

Stewart & Stevenson has engineered modification kits for conversion of 12 Series 71 diesel models to spark-ignited, natural gas operation with performance matching that of the diesel versions.

Natural gas is a good, clean-burning fuel. In many parts of the country, and this area is growing, gas is readily available, in fact, may be the most available fuel. Also, it may offer definite cost advantages on a Btu basis. This explains the growing emphasis on natural-gas engines in all sizes.

But you may have diesels . . . or anticipate movement to some place where natural gas may not be available or the price might be unattractive. Now, a new product of Stewart & Stevenson Services engineering lets GM diesel owners have their diesel and natural-gas burning capability too.

It's taken Stewart & Stevenson over three years to de-



Arrangement of external components of conversion kit on one engine showing gas connection, pressure regulator, dual carburetion and on blower housing, special valves for partial automatic fuel/air ratio balance and adjustment. Ignition source either distributor type (standard) or magneto is driven from gear train take off.

velop a modification kit for quick change-over of the Series 71 engines from fuel oil to natural-gas operation. They thought that they had it twice but it was not until the third approach that they were satisfied.

Detroit Diesel's Series 71 engines have been converted to natural-gas operation before . . . by Stewart & Stevenson and others. Some of them are doing fine *in specific jobs*. The point is that if you are going to offer a product nationally, it has to work in all types of service and work cycles.

The engine must idle well, pick up the load smoothly and surely, be flexible and yet capable of constant-speed operation with load as the major variable. Also, horsepower and torque characteristics should be the same whether the engine's operation is on fuel oil or natural gas. Otherwise, changes in the connected loads would be necessary.

All this has been done and proven in field service.

First approaches showed problems . . .

Conversion from diesel to natural gas operation sounds easy. You just replace the injectors with spark plugs and install a magneto or battery-distributor system. Then you put a natural-gas carburetor on the intake. Stewart & Stevenson engineers were not so naive as to think it this simple and tried to anticipate problems.

Yet extensive field testing proved that certain problems existed not only in the first approach but also in the second conversion kit application. After many months of experimentation with various arrangements, a number of converted Series 71 engines were put into straight gas operation in the field. Applications included irrigation pumping, electrical generation and refrigeration service.

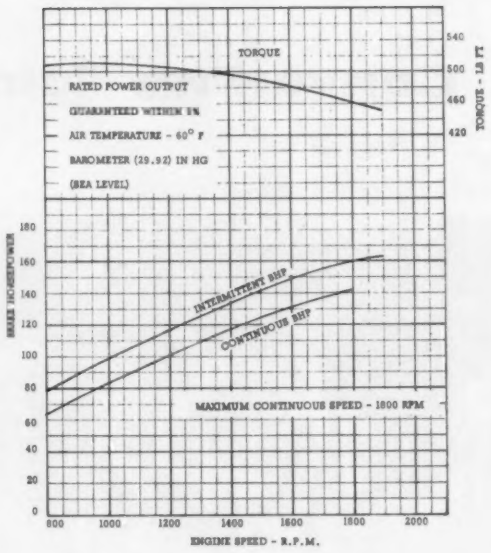
One key installation was right in the Houston plant. This gave the engineers opportunity to observe operation closely. A Model 6-71 engine turned a generator that incurred in its normal service, load cycles that varied from no-load to full-load frequently and at periodic intervals.

Problems uncovered in both the first and second approaches to a suitable conversion kit, centered around two major areas. The first concerned spark plugs and was basically a cooling problem. The second problem area was that of controlling performance and fuel economy throughout the entire load-speed range.

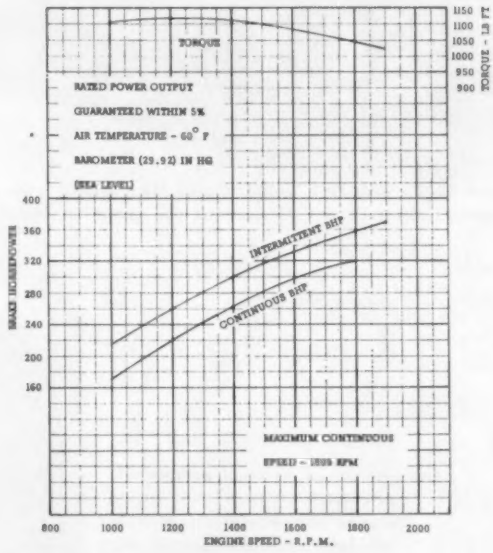
Making the spark plugs live . . .

GM's unit injector for diesel operation has the advantage of a circulating flow of fuel that helps cool it. This effect is lost with a spark plug. Also, the plug adapter first used had limited contact with the injector tube and its surrounding cooling water flow. The result was badly burned plugs and short plug life.

Solution was an entirely new adapter design. This new type provides for direct cooling-water contact. The injector tube is removed and the head modified to accept the adapter. This change, with other cylinder head modifications discussed later, has increased spark plug life by more than three times.



Typical power and torque curves, above for 6SG (model 6-71) engine; below, for 12VSG (model 12V71) engine. Series 71 engines (by cylinders) offered with natural gas conversion include 3, 4, 6, 8V, 12V and 16V's as single units; 4, 6, 12V and 16V as "Twins"; 6, 12V as "Quads".



Controlling performance and economy . . .

In diesel operation, air flow is practically unrestricted and varies only in proportion to engine speed. But in a carbureted, spark-ignition engine it is necessary to maintain a proper air/fuel ratio throughout the engine's operating range. This is the job of the carburetor. Once jets are properly sized or adjusted, the amount of fuel fed into the air stream will vary with the flow and maintain the proper mixture. Flow through the carburetor is usually controlled by a butterfly valve.

When carbureting the 2-cycle "Jimmy", the blower

(Continued on page 83)

POWER IDEAS from COTTA

Pumping Locomotives Construction Drilling

How to repower top economy into heavy equipment

Matching engine speeds to common loads made simple

Among less obvious — but more effective — ways to cut costs is the simple trick of repowering to match individual machines with modern, high-speed engines. Simple is the word.

More than one do-it-yourselfer with heavy equipment has eased himself into savings of the kind that determine whether you bid low on a job . . . or make a profit on it. That's why we say . . .

Consider gear ratios carefully when repowering an old machine or during initial design stage of new equipment. You can save at least three ways if you do:

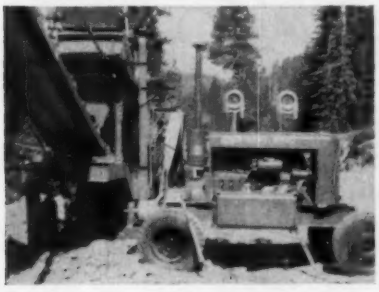
1. Engines use their most economical fuel-consumption speeds.
2. Parts and service costs drop, because machines operate at speeds they are designed for.
3. Productivity increases, because maximum torque is matched to engine rpm run up most commonly on individual equipment.

First, consider variables such as engine or anti-engine rotation, output shaft location, multiple speeds, cooling, mounting, and shifting. Incidentally, if a gearbox of standard design won't fit your dimensions, we can make one — yes, even a single unit — that *will* fit.

Next step is to determine your proper service factor from the chart next column.

Base your application on number of hours per day of full-load operation and amount of shock load encountered. Compute gear ratio required, $\frac{\text{(input rpm)}}{\text{(output rpm)}}$, and refer to capacity curve far column.

Cotta reduction gear mounted on separate mobile unit helps portable machinery meet legal over-the-road dimensions.



DAILY SERVICE AT FULL LOADS				
Load Characteristics	Occasional ½ hr per day	Intermittent 3 hr per day	8-10 hr per day	Continuous 24 hr per day
Uniform	.8	1.0	1.25	1.5
Moderate Shock	1.0	1.25	1.5	1.75
Heavy Shock	1.25	1.5	2.00	2.0

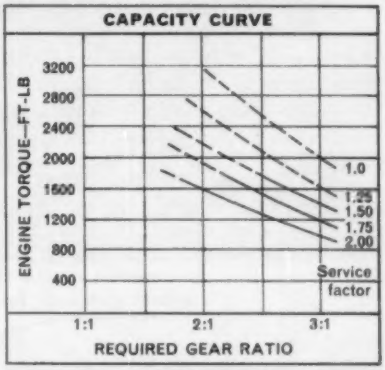
How much torque? Locate your required gear ratio at bottom of chart. Proceed up this line until you intersect curve for your service factor already selected. Read maximum allowable torque to left of this point. *Always use the maximum horsepower or torque available for the operating conditions on your job.*

To convert horsepower for torque comparisons:

$$\text{TORQUE} = \text{hp} \times \frac{5250}{\text{rpm}}$$

Capacity curve shown here is for our model GR16 reduction gear. Maximum input torque: 1650 ft-lb. Maximum input speed: 2200 rpm. Gear ratios from 1.43:1 to 3.00:1 (engine rotation), and 1.17:1 to 3.00:1 (anti-engine rotation).

You may have heard that our hand assembly of each gearbox includes 400 to 500 inspections. You can believe it. For one thing, it's the best way we know to guarantee precision alignment of bearings, shafts, and gears required to tailor input torques from 150 to 2500 ft-lb. For another, year-after-year operation is rather popular in the field. We like to be popular.



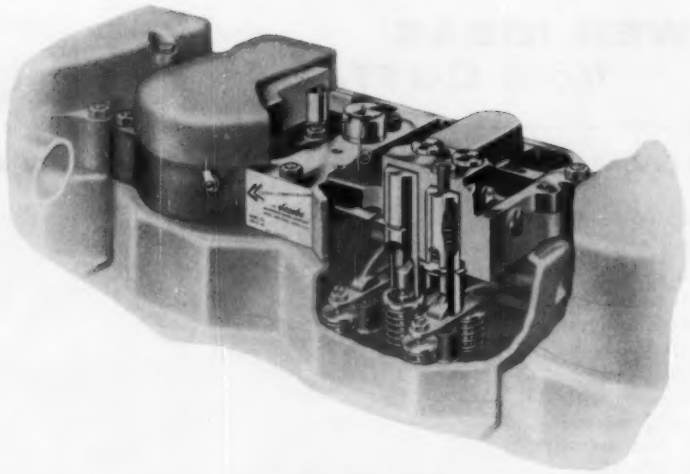
Why not match notes with our engineers . . . maybe match some moneysaving gear ratios to individual machines? Or, write for free diagrams, capacity tables, dimensions, and complete specifications. Our phone number is WO 4-5671.

COTTA

HEAVY-DUTY TRANSMISSIONS

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

For more information write in No. 108



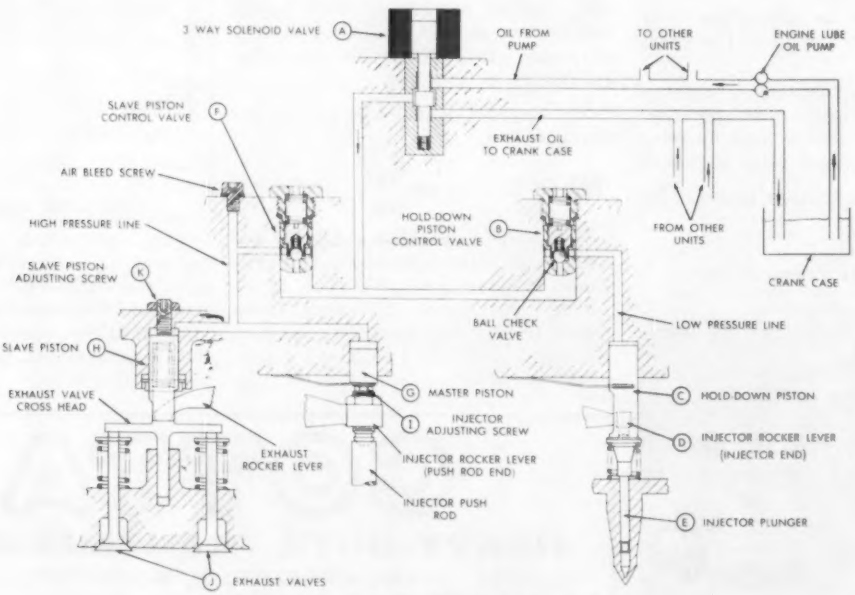
Jacobs Engine Brake Is New

Converts engine to a compressor absorbing enough energy to hold a 75,000-GVW truck under complete control at 15 mph on 10% grade without use of service brakes.

A new idea in how to get substantial braking effect from a truck's diesel engine has come from the fertile mind of Clessie Cummins, founder and retired president of the Cummins Engine Company. It works on the principle of turning the engine into an efficient air compressor during periods when retarding is needed. This is done simply and under complete driver control.

The mechanism that does the job is a "sandwich" roughly 1½-in. deep, that fits on each pair of cylinders on a Cummins engine between the cylinder head and valve cover. How it does it will be explained. These brake units are being built by the Clessie L. Cummins Division of the Jacobs Manufacturing Company. This company is probably best identified with its well-known line of drill chucks. This is a new venture, part of a diversification program.

Clessie Cummins was responsible not only for the conception of this brake but for its development. His son, C. L. Cummins, Jr. is also active in the program. Jacobs installed excellent test facilities both for development and production units. Also, field testing has been going on for two years. Tooling is complete and units are now in production. First runs will be limited to models for the Cummins NH series 4-valve engines. Units for other models and engine makes are under development.



Retarder ties in to diesel engine valve system

Here's the principle . . .

Diesels provide less normal braking effort than gasoline engines. Some find it hard to explain this since it is a common misconception that the compression stroke provides this braking effect. If this was so, the diesel with its high compression should provide much more braking when the accelerator pedal is backed off.

Fact is that it is not the compression stroke that does the braking. While compression absorbs energy, expansion on the down-stroke puts most of it back into the system. A lot of the retarding effect in gasoline engines occurs during the suction stroke when the piston is pulling against the restriction of a closed butterfly valve in the carburetor. In diesel intake systems there's no such restriction so its retarding effect is less.

Retarder Concept

Mr. Cummins started thinking. . . . "What if you could use that compression stroke without the subsequent expansion? Suppose that you were to spill the compressed air at the top of the stroke . . . say, by opening the exhaust valve . . . it would turn the engine into a regular compressor!"

How it was done . . .

Look at the schematic diagram. Solenoid valve (A) controls the system using engine lube oil as the working fluid. When energized (position shown) it permits oil under pressure to enter and force up the control valves (B and F). These are a "valve within a valve". As the body lifts against spring tension, ports align as shown so that oil can lift the check valve and flow into the passages beyond. Oil flowing through (B) acts on hold-down piston (C) to bottom the injector plunger (E), stopping flow of fuel oil to the injector cup and cutting off all injection. Injector rocker lever (D) is free to move up and down in a cut-out in hold-down piston (C).

Oil flowing through the check in control valve (F) insures that the hydraulic system beyond is filled. Master piston (G) moves down into contact with injector adjusting screw (I). Slave piston (H) at this point, remains stationary, held by its spring. The system is now ready to convert the engine to a compressor.

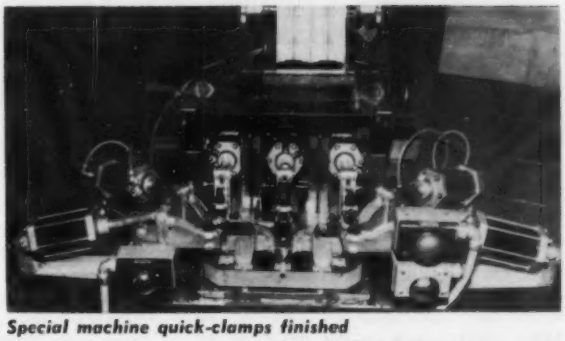
During the normal engine cycle the injection cam would start lifting the injector push rod just before top dead center of the compression stroke. This action is used to initiate compressor operation. Master piston (G) is moved up by injector rocker arm action and since the oil above it is trapped at check valve (F), the displaced oil forces slave piston (H) down, opening the exhaust valves and spilling the air compressed in the cylinder to the exhaust line.

This means that full effect of compression is obtained and since the air is spilled at the top of the stroke, there is no return of energy to the system through expansion. When braking is no longer needed, the solenoid valve (A) is de-energized and this stops

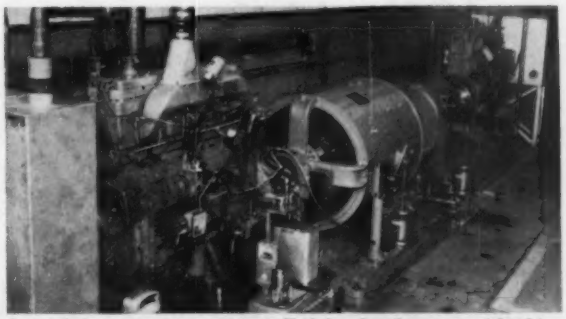
(Continued on next page)

Production-type modern tooling has been installed for fast, accurate manufacture.

Pallets of body castings ready for machining.



Special machine quick-clamps finished units for rapid, accurate complete testing.



Special dynamometer was installed for development of braking device, other products under development. Dynamometer can drive engine (to test braking horsepower) or absorb power.

Cummins-Jacobs Retarder . . .

(Continued from preceding page)

flow of engine oil to the control valves and vents this line to a crankcase return, relieving the pressure. The springs take over, pushing the valves down.

Valve design is such that oil above the master and holddown pistons is vented upward past the control valves and out of the system, allowing the springs to return them to normal position. Until braking is needed again, all parts are at rest. It should be emphasized that whenever the solenoid is "off", the brake is completely independent of the engine and all parts are at rest.

What happens when the engine's a compressor . . .

First, braking horsepower up to roughly 70% of the engine's full power is available. Capabilities for specific applications can be easily figured from the nomograph. A suitable, safe down-hill speed can be selected and transmission gear ratio picked to hold the engine at the desired rpm. This avoids engine overspeeding with all its damage. Vehicle speed is controlled and service brakes, cool and ready for work, are in reserve.

During compressor operation, the engine is up to normal rpm and is putting compression heat into the cooling system to maintain operating temperatures. Lubrication is normal throughout the engine. Fuel is completely cut off. When power is again needed, the engine is ready to accept load. The temperatures are up and the cylinders are not loaded with fuel that could cause smoking.

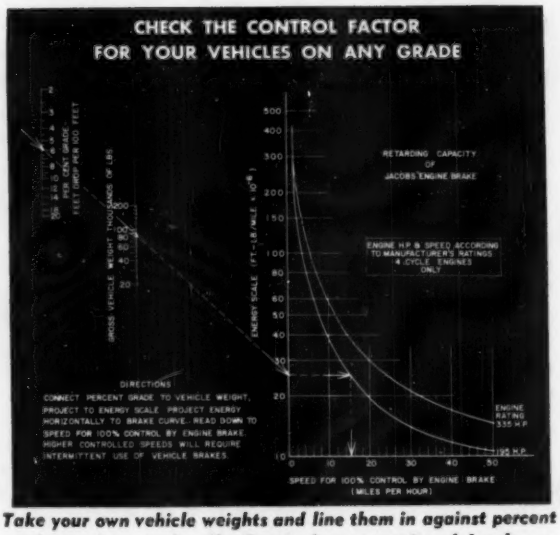
Brake controls are simple and flexible. They provide for complete driver control and can be arranged to give full use of braking effort without change in normal driving habits. In a typical arrangement, the driver switches to the "braking" position. The circuit to the solenoids would go through a switch at the accelerator pedal. Complete release of the pedal would close the switch and initiate braking. The circuit would also go through a switch on the clutch pedal that would be opened by pedal depression. The purpose of this is cut out the braking function to avoid any interference during shifting or when coming to a complete stop.

Why auxiliary braking . . .

Today's problem is not to get the big ones going, it's to stop them. In both on and off-highway operation, down-hill speeds must be kept low so as not to exceed the limits of service brake capabilities. Heat from the friction of severe and continued use is the big enemy. An effective auxiliary system, independent of service brakes, absorbs this heat and permits faster controlled descents. So one of the advantages is faster trip or cycle time.

If you don't use service brakes as hard, expensive parts will not need replacement. If you don't use them as often, it stands to reason that they'll last longer, reducing maintenance costs.

Field test are showing from two to five time the service life. Smoother vehicle braking is showing promise of longer tire life. Also, the engine benefits since its temperature is held more constant and the cutoff of


CHECK THE CONTROL FACTOR
FOR YOUR VEHICLES ON ANY GRADE
RETARDING CAPACITY OF JACOBS ENGINE BRAKE
ENGINE H.P. & SPEED ACCORDING TO MANUFACTURER'S RATINGS 4 CYCLE ENGINES ONLY
ENERGY SCALE (FT-LB/MILE x 10⁶)
GROSS VEHICLE WEIGHT THOUSANDS OF LBS.
DIRECTIONS
CONNECT PERCENT GRADE TO VEHICLE WEIGHT; PROJECT TO ENERGY SCALE. PROJECT ENERGY HORIZONTALLY TO BRAKE CURVE. READ DOWN TO SPEED FOR 100% CONTROL BY ENGINE BRAKE. HIGHER CONTROLLED SPEEDS WILL REQUIRE INTERMITTENT USE OF VEHICLE BRAKES.
ENGINE RATING 335 H.P.
SPEED FOR 100% CONTROL BY ENGINE BRAKE (MILES PER HOUR)

Take your own vehicle weights and line them in against percent grade you have to handle. Graph shows capacity of Jacobs engine brake for your operation. Retarder utilizes 70% of power.

fuel not only helps to reduce crankcase contamination but saves fuel, another plus value.

These brake units add only about 70 pounds to the vehicle's weight. This is little enough for the advantages gained. These extend into the area of servicing as well. For example, by disconnecting the wires to the solenoids, manual operation of the individual valves is possible. This means that cylinders can be cut out separately to locate a faulty injector . . . or a rebuilt engine can be broken in under load. Two cylinders can be used as compressors to load the others and then switched so that all cylinders get the break-in period.

Sales and service now set up . . .

Jacobs may be new to the automotive field but they know the essentiality of adequate sales and service facilities. Mr. Cummins saw to that; he's no novice in the trucking field. Mr. Page Wodell, sales manager for the division, outlined their program.

Initial concentration has been west of the Mississippi and in mountainous areas where need for retarding is the greatest. Eight base dealers have been set up and each has its sub-dealers. The total comes to over 100 outlets where sales, parts and service are available.

Even before production models hit their shelves, a program of indoctrination and education was under way. A 3-man team from the factory is making the rounds. They have all the sales and service materials needed to do a good job.

Installations will be made by the dealers or the brake units will be sold to fleets as complete kits. No special tools are required. Actual installation takes only about four-man-hours. This is after some preparatory work such as cab wiring and installation of controls has been done. This can be done at convenience, say, during normal servicing periods, so that the truck is only out of service for the 4-hr period.

There's no question that a service-brake-saver is a money-saver, too. How long does it take to pay it off? That all depends on how much you use your equipment.

GET REAL PRODUCTIVITY—GET A GM DIESEL

Nevada's Denio Bros. Trucking Co. have facts and figures to prove that some Diesels are far more profitable than others:

They'll tell you that since putting a GM "6V-71" engine in this truck (72,000 lbs. GCW) they're making three extra trips a week—equal to about $200 more revenue!

And with the "6V-71" they're getting up to 6.2 m.p.g.—35% better fuel mileage than they got with a turbocharged 6-cylinder Diesel of another make.

Operating at 4300 to 6100 feet in the Reno area, Denio Bros. report this re-powered truck "*can outpull anything on the logging roads and the main highway. Several gears never used on the 200-foot climb to the woods. Similar units on same grades run 1½ gears lower.*"

If you want peak productivity from your trucks, investigate the money-saving advantages of proven GM "6V-71" and "8V-71" engines. You get more power in a more compact package—with less weight per horsepower—than in other Diesels. You get more "go" per gallon, and maximum torque to take the toughest grades in stride. For the full story, call your GM Diesel Distributor—he's listed in the Yellow Pages under "Engines, Diesel." Call him today.

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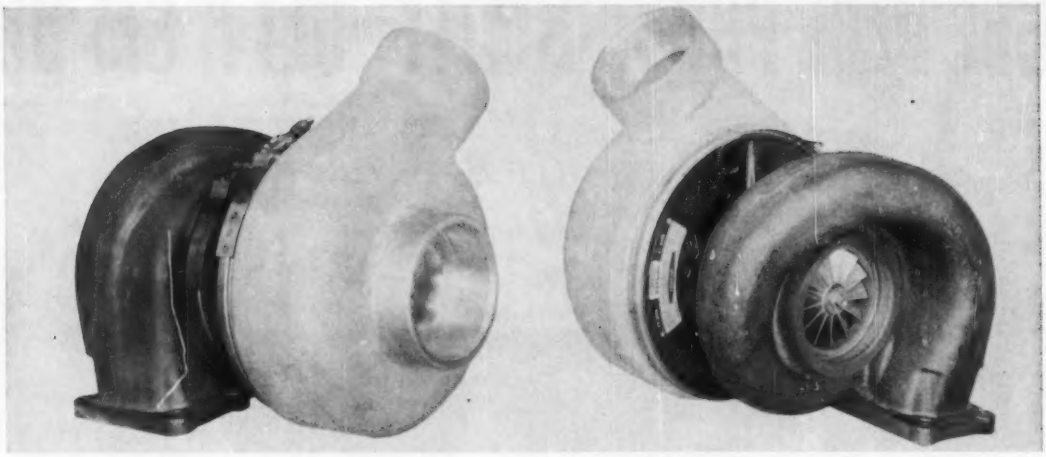
For more information write in No. 109



Product Report:

New Turbocharger Designed

Schwitzer's Model D's feature broad range of flow coverage from low to high pressure ratios . . . many advanced design features.

Today's diesel engines show two strong trends—higher output from the same "package", largely through turbocharging; and a greater degree of standardization, particularly of components. Both of these trends provide strong user advantages and so can be expected to continue, even intensify, in tomorrow's engine designs.

Recognition of this has been behind intensive research and development in Schwitzer laboratories. Result—their new series of Model "D" turbochargers, designed not only for today's engines but to fit the requirements of future designs. Following basic development, these units underwent both laboratory and field test and are now being used on production engines.

Before discussing some of the mechanical features, here is some data showing what has been done in the context of the trends mentioned. The series consists of five models with different flow capacities obtained by simply changing internal parts. Overlapping ranges as seen in the table below permits close matching to any particular engine requirement.

Model	Capacity at 2.0 Pressure Ratio
4D-354	200 to 500
4D-454	300 to 700
4D-554	400 to 900
4D-654	500 to 1000
4D-754	600 to 1100

Compressor performance coverage of each model is illustrated. Each model has broad flow coverage not only at low pressure ratios but at the higher pressure ratios required by present and future advanced engine designs, many that will use inter-cooling.

With respect to the standardization trend, bear in mind that the broad performance range is obtained within a single frame size. This will permit use of mounting parts common to many engine models, sizes and ratings. Also, the interchangeability of all internal parts greatly simplifies maintenance and servicing.

Mechanical Details

The turbocharger is comprised of four major components—the turbine and compressor housings, the rotating assembly and its bearing housing or core assembly. This housing is new in design and has simplified fully-machined, internal oil passageways. Oil flow to the bearings is improved and lag in delivery of oil on engine start-up is reduced to a minimum. The passage also provides adequate oil drainage even at high turbocharger tilt angles.

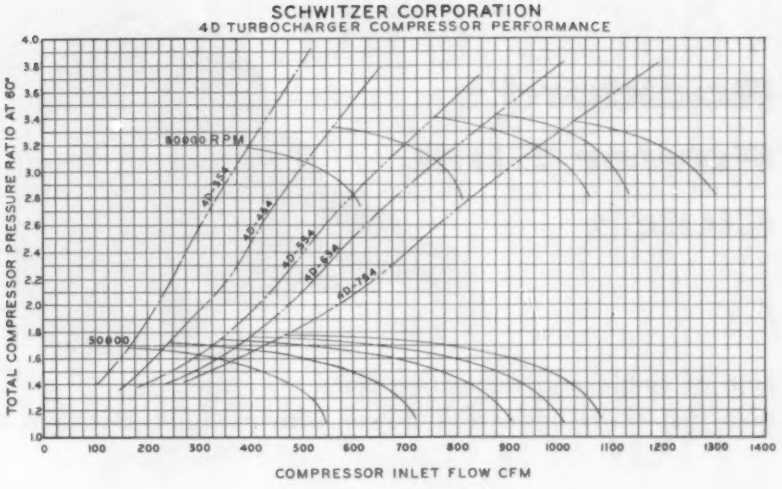
Bearings are of the "full-floating" type pioneered by Schwitzer for high-speed turbochargers. Purpose of the new advanced design was to assure completely stabilized operation at all speeds. Bigger, more-uniform oil films on the surfaces prolongs bearing life.

There's a new and unique oil seal. Schwitzer undertook intricate studies of internal oil-flow patterns to find out what was going on. Result is an oil seal arrangement that prevents leakage even under extreme inlet vacuum conditions.

Compressor wheels were designed for minimum stress and maximum vane stiffness. These high-performance, new-contour wheels are precision-cast from premium-strength aluminum alloys to extremely close tolerances.

Precision-machined diffuser surfaces, working with the compressor wheel, allow greater flow rates through it and with less friction. Another advantage of the precision-machining is that it contributes to duplicate performance, unit to unit.

The turbine wheel at the other end of the rotating assembly is also precision-cast to very close tolerances. Different alloys can be used to match various engine



for Today's and Tomorrow's Diesels

requirements at lowest possible cost. As to design, prime considerations were to get minimum stress, minimum inertia and high flow-through capacity. Combining these to the highest degree is a requisite in meeting demands of modern high-speed diesel engines.

Schwitzer has always designed for "instantaneous response", the advantages of minimizing turbine lag, particularly in vehicular applications, being obvious. This feature is retained in the new series while upper speed limits of the rotor have been extended.

Nozzle rings are also made with new precision. Finely-controlled throat openings provide close regulation of hot inlet gases entering the turbine. As in the case of compressor parts, precision construction also contributes to uniformity of performance, unit to unit.

Clamp bands hold the housings together. This simplified construction has several advantages, not the least of which is elimination of a lot of bolts. Stresses and strains as caused by misaligned connections are not transmitted through bolted or gasketed joints.

With clamp bands, it's easy to service and clean the unit. The compressor housing or the entire core assembly can be removed for servicing without disturbing the turbine housing bolted to the exhaust manifold.

Universal positioning of each housing is possible. This permits the oil drain in the core assembly to be always positioned vertically. Also, maximum flexibility in locating connections is afforded.

Schwitzer is also developing a practical program of field service, with specially-trained personnel and a special test kit for checking turbo performance and verifying deficiencies in the field.

Earlier Models to Continue

This Model "D" series will augment, not replace, the present line of 3-in., 4-in. and 6-in. sizes. These are in widespread use and are proving daily that turbochargers are not "a wristwatch strapped to the engine" that some people claim. Maybe once, but no more. In vehicular service alone, many have operated in excess of 500,000 miles and many thousand more are over the 250,000 mark. Not only will present models continue but they can be supplied with many advanced features found in the "4D" models.

Rounding Out the Picture

Schwitzer's research and development program is not conducted in a vacuum. It is guided by association and cooperation with builders and users of turbocharged engines. Also, experience gained is at disposal of engine builders and users alike so that successful application of turbocharged engines can continue to expand.

However, there's another and very important area where much can be done — field service. With announcement of this new turbocharger design, Schwitzer also reports advances in developing a practical field service program. It starts with design for easy serviceability in the field. Next, service personnel are trained for field servicing. Also, special test kits have been developed for checking turbo performance and verifying correction of deficiencies found in the field.

Product Report:

Rockford's Power Shift Clutch

Line of single and dual-drive units give fast shifts under full power with modulated-torque engagement.

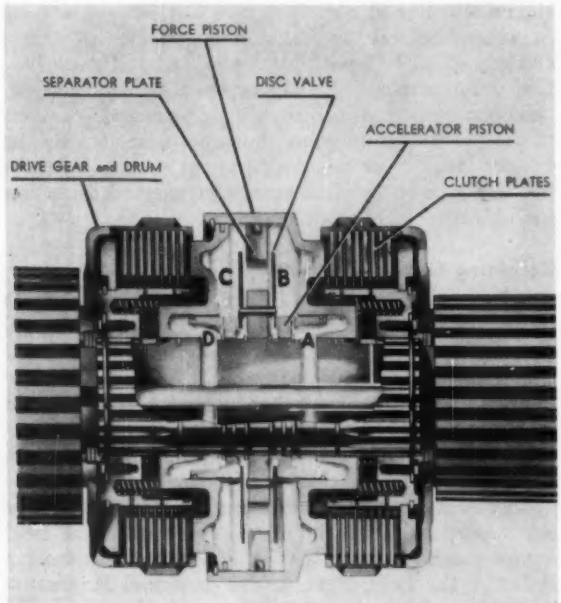
For the past five years, Rockford Clutch has been developing and testing a line of dual and single-drive hydraulic power-shift clutches. Aptly called Power Shift units, they are now available for incorporation as components in a wide range of power transmission applications, allowing manufacturers to build for customer's specific needs. These compact clutches are built in six sizes, with a range of torque capacities to 10,000-lb ft. This will handle a broad range of horsepower and also speeds of up to 5500-rpm.

What and Why . . .

Power Shift is a transmission component that provides a hydraulically-actuated clutch for each gear ratio. The gears are in constant mesh, and power lock-up in the desired ratio is completed by engaging the appropriate clutch. Dual-drive design has two clutch units and the associated drive gears in the same package.

Power Shift provides smooth gear selection with extremely fast engagements. Shifts can be made under full power with essentially no interruption of power flow. Though action is rapid, torque transmission of these clutches builds gradually because of Rockford's torque modulation feature.

With power shifting, work cycles are shortened because average trip speeds are higher. Power flow is virtually uninterrupted regardless of number of time ratios are changed to meet operating conditions. Engagement is positive; there's no chance of "missing" the shift. When climbing, there's no severe loss of speed as can occur during conventional downshifting, particularly if engagement is "missed." During descents, there's always positive connection of engine to wheels for braking effect. With gears in constant mesh, gear "raking," with its attendant maintenance costs, is avoided.



Dual-drive power shift clutch units have separate clutch plates for each ratio, with driveline gears in constant mesh. Gear ratio is selected by engaging clutch for that set of gears.

How Does It Work . . .

Examination of the dual-drive unit's section shows two clutches within the general housing. Actually the housing is in several parts mounted coaxially on the center shaft. Mounted in the center of the assembly and on the center of the driveshaft is the separator plate. The force piston, two telescoping halves, are centered, with respect to the separator plate, by springs, when the clutches are not actuated. The disc valve can slide to allow any necessary transfer of oil to equalize pressures. Clutch driving plates are turned by the center shaft. Driven clutch plates are attached to the drums and their attached drive gears.

Actuating oil for clutch application enters through a bore in the shaft. In the bore is a tube such that oil for the left clutch (passage "D") flows through the tube. That for the right clutch (passage "A") flows through the annular space between the tube and the bored hole.

Assume that the right-hand clutch is selected for

(Continued on page 83)

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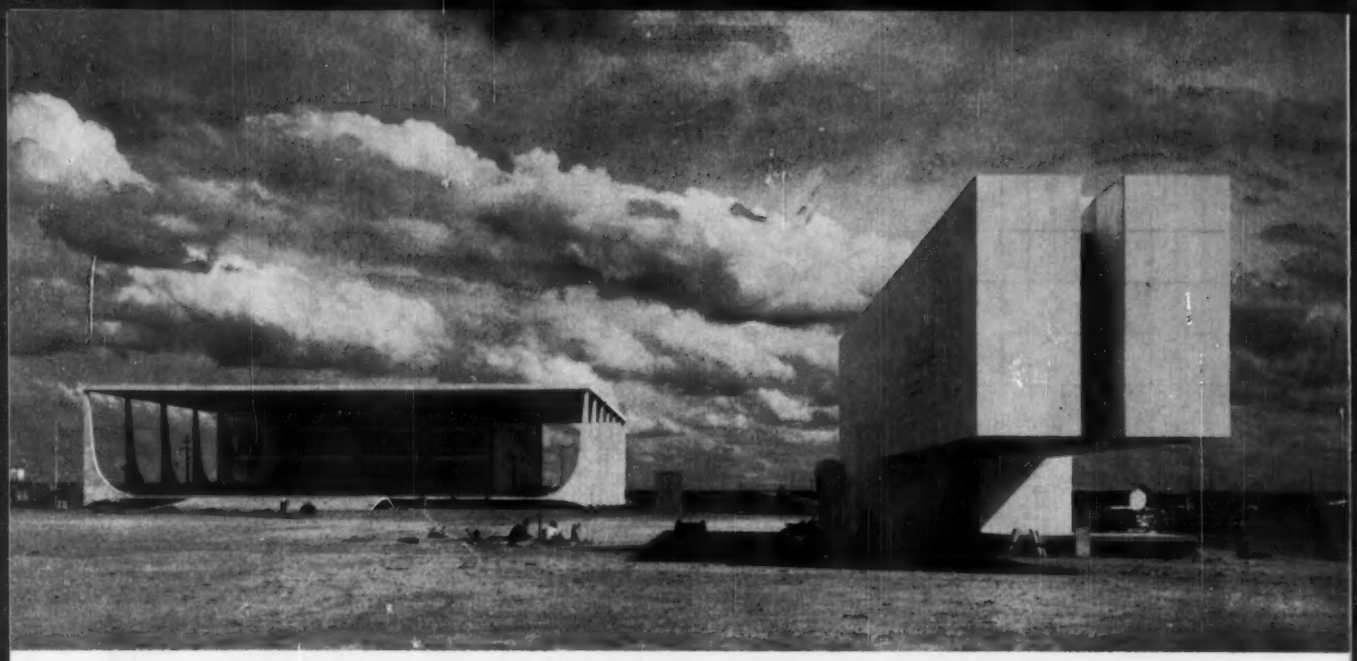
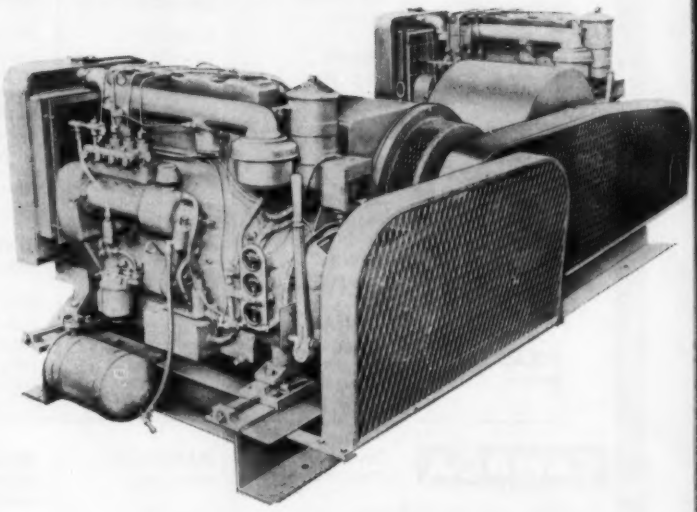
AP. 130



Sheppard Diesels Supply Vital Communications Link

Jungle-based diesel generating sets power micro-wave relay stations for Brazil's new capital.



One of mankind's most ambitious projects is now nearing completion down in South America. Brazil, the fifth largest country in the world, has gone to work and built itself an ultra-modern capital city—built it completely "from scratch"!

Located out on the mountain plains of central Brazil where no roads exist, "Brasilia" is over 2½ air hours from the nearest civilization. Brasilia, however, is not just a beautiful mountain resort that is isolated from the world.

It is vital that a dependable system of micro relay stations—handling communications—link this young city with the rest of Brazil as well as other cities.

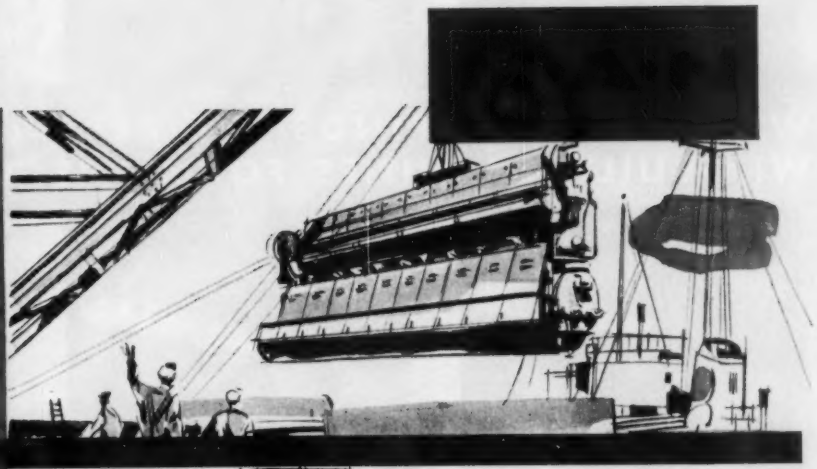
Project for micro-wave relay stations between Rio de Janeiro and Brasilia was awarded to Radio Corporation of America who, in turn, selected the R. H. Sheppard Company as their source for diesel generating sets. Since the relay stations would have to be self-contained units in the wilds of Brazil's jungles, considerable preplanning was necessary.

Problems of transportation demanded trustworthy sources of power for the precise RCA equipment. Connecting stations are powered by standard 19B Sheppard diesel dual gen-sets, most of which are of the 20-kw sizes. At Rio de Janeiro and Brasilia, however, since there is a source of city power, each station has a standby "No-Break" generating sets.

(Continued on page 77)

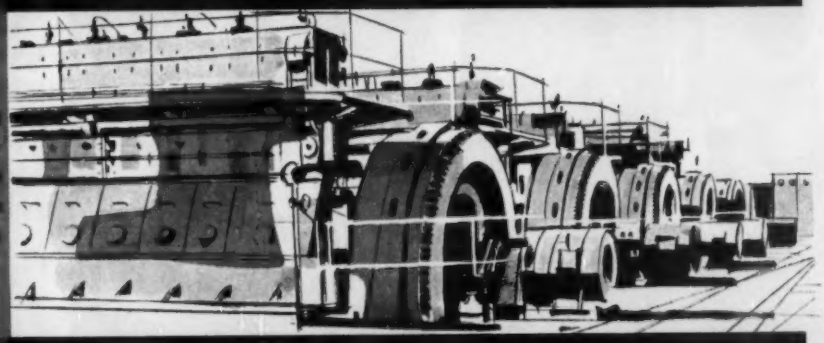
MARINE DIESELS

are built by M.A.N., the oldest Diesel engine manufacturer of the world, up to an output of 22,000 BHP. These four or two-stroke engines of in-line or Vee design are turbocharged or naturally aspirated.



POWER STATIONS

with M.A.N. Diesel engines or gas Diesel engines require little maintenance. M.A.N. Diesels are reliable helpers for the drive of generators and pumps or for the exacting work in the drilling fields.

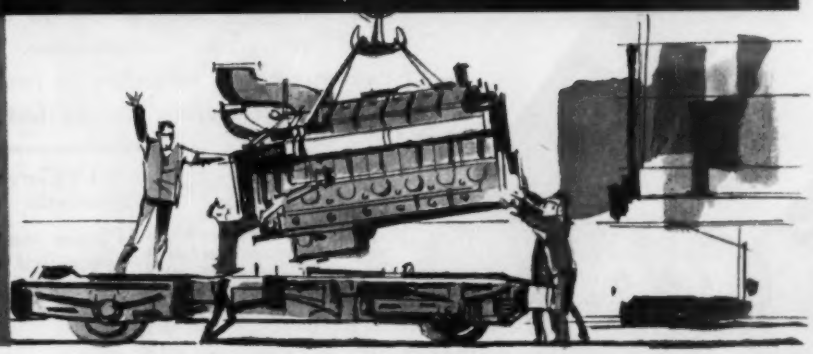


AT BUILDING SITES

perfect service of "mobile power stations" with M. A. N. Diesels starting immediately at low outside temperatures. Mobile Diesel three-phase sets are built for outputs from 14 to 140 kVA.

FOR INSTALLATION

in Diesel railcars and locomotives, cranes and special vehicles M.A.N. engines are provided for direct, hydraulic or Diesel-electric power transmission. M.A.N. have service bases and representatives all over the world.



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WIX has advanced the filtration of Diesel Fuel and Lubricating Oil a giant step with filter cartridges wherein precise control of weight, density and dimensions provide an entirely new standard of performance. These new WIX cartridges represent an important contribution to operating economy and preventive maintenance. This family of advanced type cartridges is now available for all your diesel engines. Get the facts today!

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For more information write in No. 112

No-Break Details . . .

Sheppard No-Break generating sets were developed for the many applications in the electronic and communications fields where slightest power interruption can damage costly equipment or interrupt vital services. (And, with the erratic voltage so common in Brazil, Sheppard No-Breaks are, as a matter of fact, frequently called into service.)

These No-Breaks are typical Sheppard units which consist of (1) a diesel engine, (2) a synchronous generator or motor-generator and (3) a flywheel. These components are mounted on a common I-beam base. All three components are inter-connected with vee-belts designed for long life and easy serviceability of each unit.

Each component can be individually removed and replaced without re-alignment problems. Entire unit can be installed without any possibility of pulling any parts out of alignment.

With city power applied, the motor-generator or synchronous generator drives the flywheel through the vee-belt drive. When power failure occurs, the city line is automatically disconnected and the Sheppard diesel is automatically started by its own electrical system. In the meantime, the flywheel is driving the generator to supply power to the load. As engine speed matches generator speed, diesel power is applied to the generator through an overriding clutch and a vee-belt drive, continuing to supply power as long as needed. After city power returns to minimum allowable values of frequency and voltage for a predetermined time, the Sheppard diesel is automatically stopped and city power is restored to the load.

New Product Assures 100% Power . . .

A new full-time power package has been developed by Sheppard as a result of its Brazilian experiences. For remote locations and other areas where high-quality outside power is not available (but where a No-Break operation is required), the new dual No-Break generating set was developed.

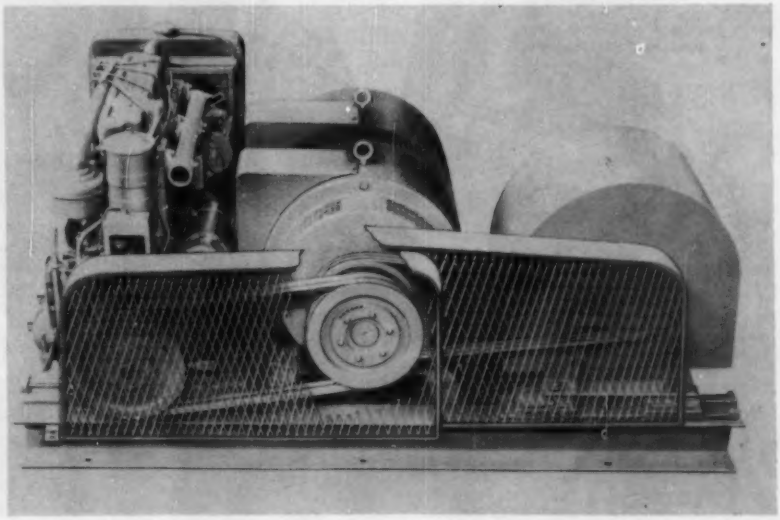
Sheppard's dual No-Breaks provide full power and maintain 100% of normal power values at all times. These units consist of (1) a diesel engine, (2) a synchronous generator or motor-generator, a (3) flywheel and another diesel engine. All components are interconnected with vee-belts and mounted on a common I-beam base.

Sheppard Plays Its Part . . .

It has been said that the brand new capital city of Brasilia is "a city with solutions, not problems, built in." Teamwork has been responsible for licking these problems. And one of the key players on the Brazilian team is the Sheppard diesel. It helped make this ultra-modern city in "the wilderness" possible.

Sheppard Equipment List For Brazilian Project

Item	*Supplier*
Air Filter	Air Maze
Lube Oil Filter	Fram
Fuel Oil Filter	Fram
Batteries	Auto-Lite
Starting Motor	Auto-Lite
Starting Motor Solenoid	Auto-Lite
Battery Changing Generator	Auto-Lite
Voltage Regulator	Auto-Lite
Main Generator	Kato
Control Panel	Swam
Oil Level Regulator	Ren
Hydraulic Throttle Solenoid Valve	Skinner
Run Away Start Protector	Swam
Exhaust Muffler	Burgess
Gauges	Stewart-Warner
Radiator	General Radiator
Fuel Supply Pump	Sheppard
Safety Controls	Minneapolis-Honeywell



Cut-away Sheppard's No-Break Gen Set, showing placement of engine, generator and flywheel. Components are inter-connected with vee-belts for easy servicing . . . eliminates re-alignment problems. Units pair up to answer need for Dual No-Break generating sets.

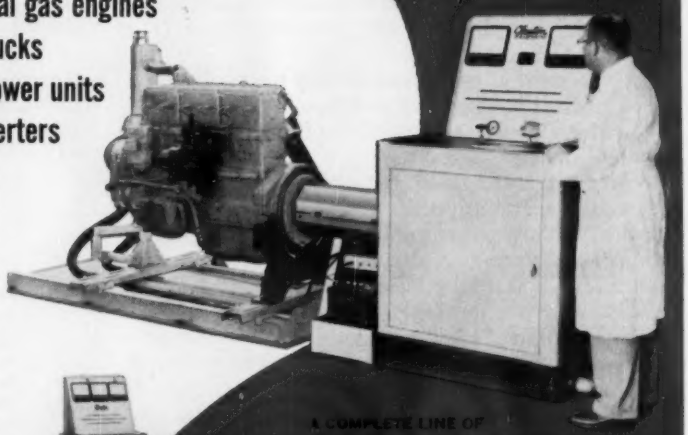
INSURE PEAK RATED PERFORMANCE FOR HEAVY DUTY EQUIPMENT

Clayton DYNAMOMETERS

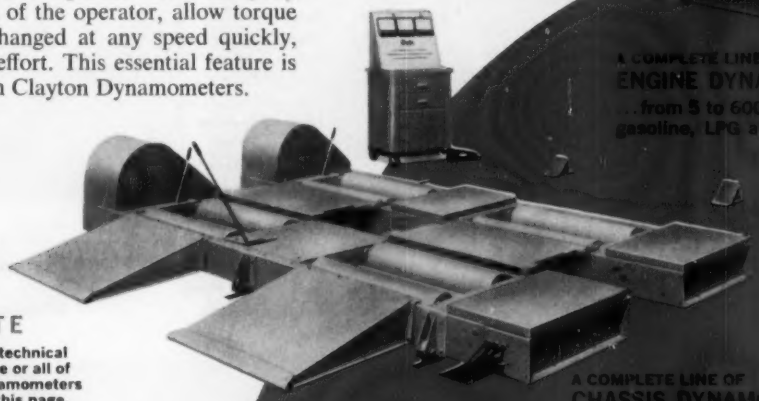
POSITIVE POWER TESTING

for: ★ diesel, gasoline, LPG and natural gas engines
★ single or multiple-axle drive trucks
★ power take-offs; tractor and power units
★ transmissions and torque converters

ONLY Clayton makes a complete line of test equipment for accurately weighing horsepower output and determining operational efficiency of power plants, whether vehicular, portable or stationary. The Clayton "Turbo-closed" principle of power absorption is unique in its ability to maintain any desired torque load indefinitely or, at the option of the operator, allow torque load to be changed at any speed quickly, and without effort. This essential feature is *exclusive* with Clayton Dynamometers.



A COMPLETE LINE OF
ENGINE DYNAMOMETERS
...from 5 to 6000 h.p. for testing diesel, gasoline, LPG and natural gas engines.



WRITE
...for specific technical data on any one or all of the Clayton Dynamometers illustrated on this page.

A COMPLETE LINE OF
CHASSIS DYNAMOMETERS
...for testing vehicles of from 150 to 800 rear wheel horsepower; passenger cars and trucks with single or multi-wheel drive.

UNIVERSAL TRACTOR TEST EQUIPMENT
Universal Tractor Test Equipment adapts a Clayton Engine Dynamometer for testing all popular tractors. Also tests heavy duty rubber tired construction vehicles equipped with power take-off drives, driving through mechanical transmission or torque converter.

Clayton MANUFACTURING COMPANY
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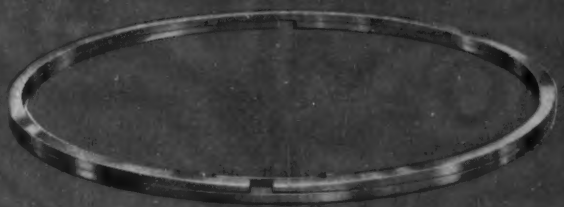
COOK PLAIN RING, TYPE 101 — This is the basic one-piece compression ring made of Cook's Graphitic Iron with a 45° angle joint. Proper ring tension — which never wears out is provided by Cook's exclusive knurling process.



COOKTITE SEALING RING, TYPE 109 — Completely seals the ring gap, ring groove, and cylinder wall in both new and worn cylinders. Will increase cylinder life, eliminate compression losses and reduce fuel consumption.

COOK OIL CONTROL RING, TYPE 303-DCX — Will conform to shape of cylinder whether surface is true or out of round. Features lifetime coil spring. Most copied oil control ring in the world.

TYPE 301-1X — This is a double-acting full sealing ring that is actuated by a coil spring and has complete flexibility to assure perfect cylinder contact even in worn cylinders.

COOK SEGMENTAL RING, TYPE 104 — Consists of three or more outer segments with step-cut joints actuated by a flat inner steel expander. Provides efficient seal on both cylinder and groove.

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Good PM Includes Lube Testing

Kits for field-testing are inexpensive, effective . . . spot-check lube oil condition without taking vehicle off the line.

When should oil be changed? Should it be drained when it might still be good, or should you take a chance and try to stretch it? One way to reach a decision is to guess, but today's operator faced with this decision has a choice of aids to guide him.

One is laboratory-type analysis of the used lube oil. The second is use of one of the field-check methods that can do a satisfactory job more quickly and usually at less cost than full analysis. Ideally, field checks backed up by periodic lab-type analysis as a control is best. Full verification of results is found in the study of subsequent maintenance records.

One method of spot-checking lube oil quickly, without removing the vehicle from service or draining the oil, is being used by several trucking companies. United Keno Hill Mines Ltd's Transport Division (operating in the Yukon) changes oil at 5800 miles, on the basis of two spot oil samples taken at multiples of weekly service of approximately 1800 and 3600 miles. Prior to relying on this method, all sampling was done by lab analysis. When spot-test correlation with lab analysis was found to be good, lab analyses were discontinued.

Hoffman Truck Center of Annapolis, responsible for service and maintenance of the vehicles they sell, uses the oil-sample spot-check method to check filter efficiency and general engine condition. Presence of water, antifreeze, abrasives and fuel diluents indicate specific maintenance items required. To them, the oil sample spot-check is a useful maintenance tool.

The kit that United Keno Hill and Hoffman use is the Simplex Oil Testing Kit, manufactured by Lengor, Inc., Annapolis, Md. A portable case holds all the equipment for determining acidity, abrasive solids, fuel dilution and water in the sample. Testing is done on the job site. Here's how it works.

Testing for Abrasive Solids . . .

Using the hand pump to draw off a sample, a drop is placed on a piece of blotter-like paper. The oil ring that forms is compared against a series of sample stains on a solid-contaminants chart, and matched to its closest counterpart. If the stain is a uniform shade of gray, dispersant level of the oil is high enough to keep the impurities in solution. Filter is effective, too. If, however, stain is dark in the center lightening toward the edges, dispersants in the oil have been depleted and impurities are starting to settle out. Both oil and filter require changing.

Hoffman Truck Center checks lube with vehicle still in service.

Testing for Acidity . . .

A measured quantity of sample oil is placed in the reaction vial provided in the kit, and an equal quantity of reagent is added. The two are thoroughly mixed. If acid is present it changes the color of the reagent. Blue is neutral, with degrees of contamination swinging the reagents color toward yellow. A color chart is supplied for color comparison to determine acid level.

Testing for Viscosity . . .

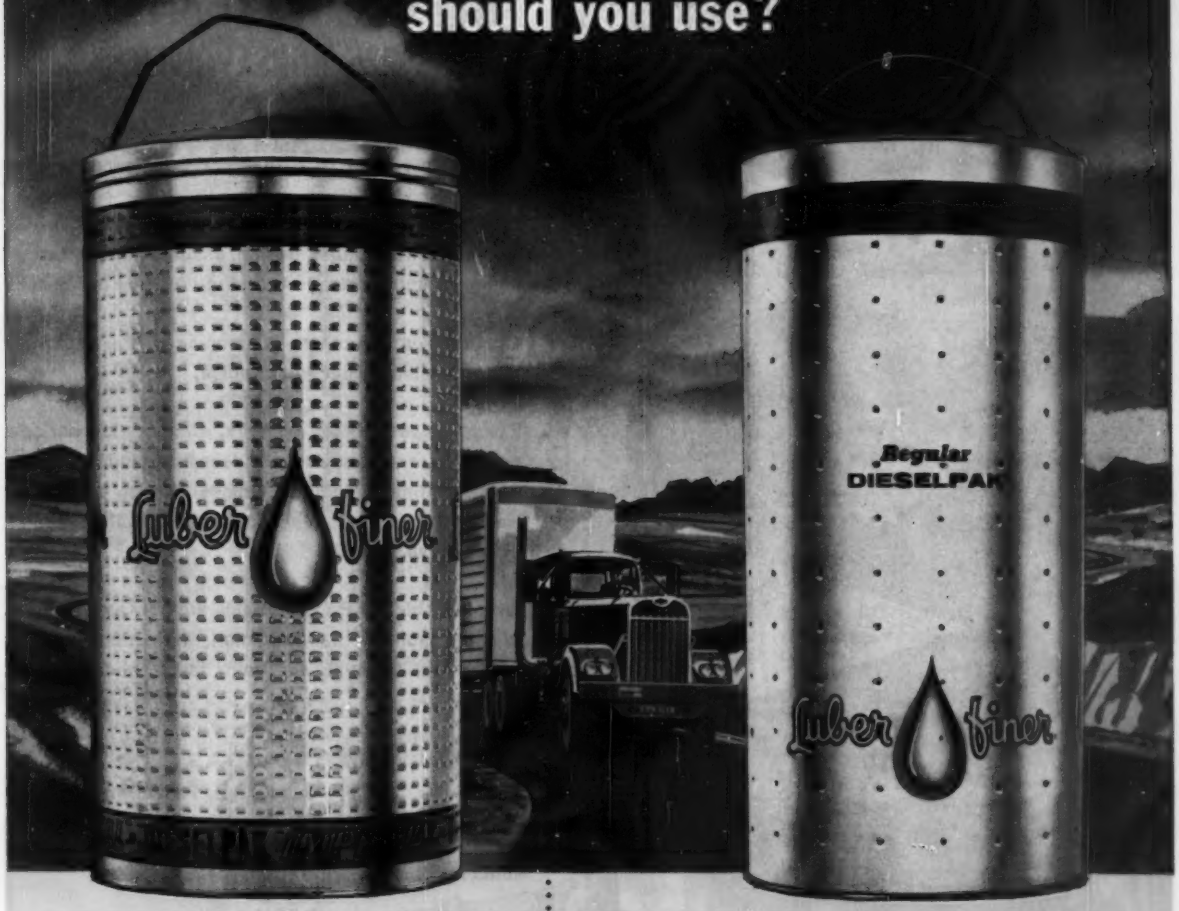
Two jars are provided: one is filled with new oil prediluted to maximum acceptable level—say, with 5% fuel oil; the other holds test oil as removed from the engine. When temperatures have equalized, two identical cups with identical orifices are lowered into the jars, filled, raised, and allowed to drain. Since drain rate is proportional (inversely) to viscosity, dilution exceeding maximum acceptable level is quickly observed as the used oil will drain faster than the control sample.

Setting the Standards . . .

Key to success of the spot-check technique depends upon how carefully the "safe" level is established. Engine lube requirements vary with fuel, load and operating conditions. Identical engines side-by-side may have different requirements. When the system is being set up, and occasionally thereafter, lab findings should be correlated with field reports to establish safe limitations. This is especially important if engine location or operating conditions are changed. Use every possible aid in setting up the "standards" . . . the engine builder, the test equipment manufacturer. Also, the supplier of the lube oil can supply useful information.

Thus, a quick and simple lube-oil test procedure can be used to get full useful life out of the oil without stretching use to the point where the engine suffers. Maintenance records are the final check of the system's effectiveness. Done properly, used lube oil testing can save operating and maintenance dollars.

Which model DIESELPAK® should you use?



...both give genuine Luber-finer performance and protection recognized superior by the industry!

IMPERIAL DIESELPAK®

The one replacement pack that can deliver 7,000 to 12,000 miles of proven superior filtration. Makes possible fewer oil and pack changes and extended maintenance schedules. Based on cost per mile, IMPERIAL DIESELPAK is the most economical replacement pack you can use.

REGULAR DIESELPAK®

The only low price pack with genuine Luber-finer quality and performance. Designed especially for maintenance schedules calling for frequent oil and pack changes, 4,000 to 7,000 miles. REGULAR DIESELPAK, now available in the 500 and 750 size, out-performs every other pack regardless of price—except the IMPERIAL DIESELPAK.

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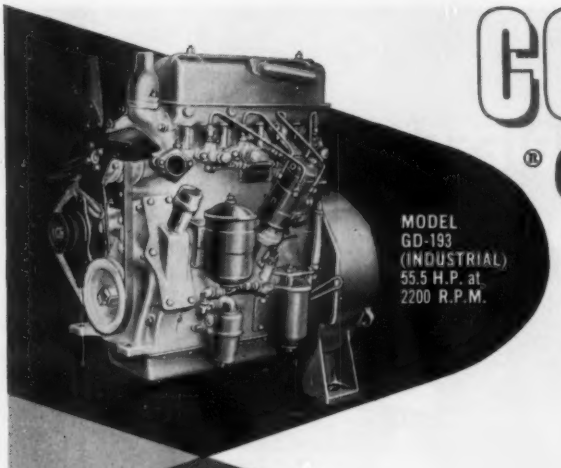
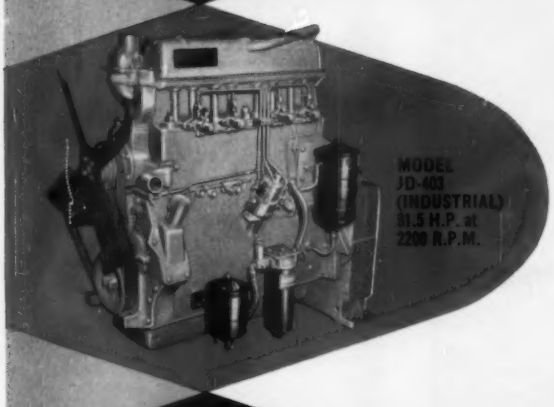
THIRTY-ONE MODELS

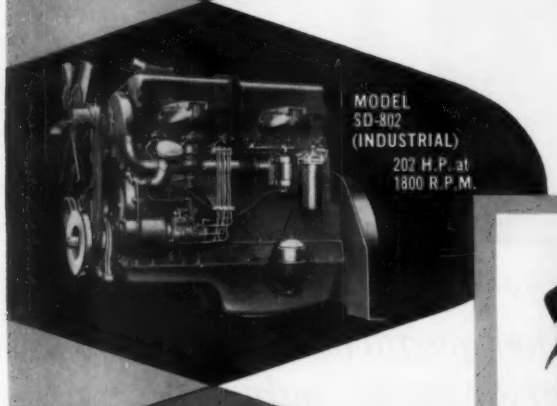
34 to 225 HORSEPOWER



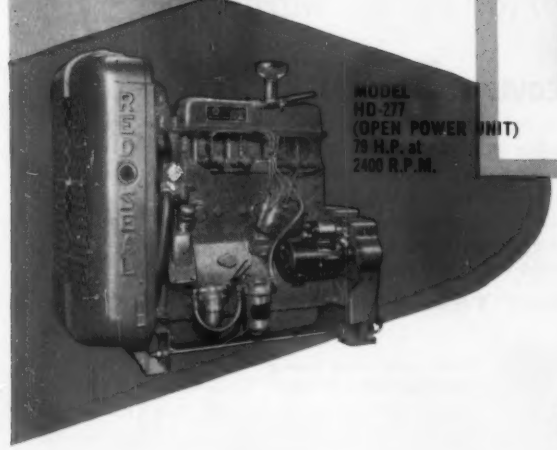
MODEL GD-193 (INDUSTRIAL) 55.5 H.P. at 2200 R.P.M.



MODEL JD-403 (INDUSTRIAL) 91.5 H.P. at 2200 R.P.M.



MODEL SD-802 (INDUSTRIAL) 202 H.P. at 1800 R.P.M.



MODEL HD-277 (OPEN POWER UNIT) 79 H.P. at 2400 R.P.M.

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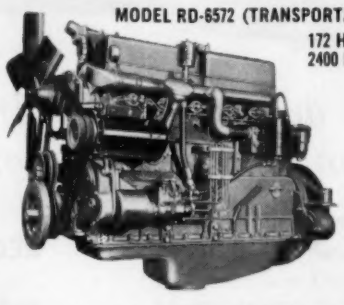
3. Easing of peak forces on rods, shafts, and bearings makes for longer service, with less time out for repairs. By permitting wide interchangeability of parts with Red Seal gasoline models, it greatly simplifies the job of service in the field.

Continental Cushioned Power Diesels are now available for various applications in transportation, agriculture and industry. Write for bulletins and color folder showing how Cushioned Power works.

PARTS AND SERVICE COAST TO COAST



MODEL RD-6572 (TRANSPORTATION) 172 H.P. at 2400 R.P.M.

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For more information write in No. 116

Power Shift Clutch . . .

(Continued from page 72)

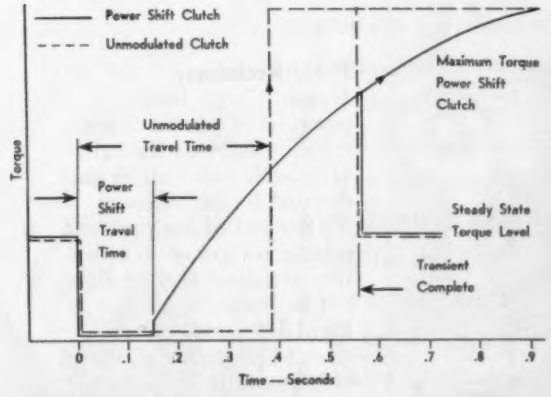
actuation, Pressurized oil flows into passage "A," pressurizing the chamber. This forces the accelerator piston to the left, forcing the disc valve to close. At the same time, working fluid is bleeding through an orifice in the accelerator piston into chamber "B." As pressure builds in "B," force piston is pushed to the right. This action clamps the driving and driven clutch plates, engaging the clutch.

Engagement, though rapid, is nontheless gradual. Rockford's modulated torque feature of controlling rate of pressure build up insures this. By design control of orifice size in relationship to other volumes, required speed of operation is obtained while preventing the clutch from slamming into engagement. This modulation provides smooth engagements that give longer clutch and driveline life.

Changing gear ratios with power shift requires less than one second. Torque transmission is lost for 0.15-seconds (see graph) before it starts to rebuild and reach a maximum. This requires 0.75-seconds additional. Since full torque transmission capacity is seldom needed, a shift is completed, usually, in 0.6-seconds.

Conclusion . . .

To the transmission builder, the unit's compact design and other features, plus the line's wide capacity range, allows pin-point matching of components to the job. This works to the advantage of the user, too. In addition, the user receives adjustment-free, self-lubricated low-maintenance components that hold down maintenance costs and make it easier for him to do his job faster. Increased utilization of expensive construction equipment means higher earning power.



Rockford's power shift clutch has modulated torque action that prevents slamming into engagement. As graph shows, torque transmission is momentarily lost, for 0.15-sec., then rebuilds to full capacity. Normal shift takes 0.-6-sec.

GM Gas Conversion . . .

(Continued from page 64)

creates somewhat of a problem. This positive-displacement, engine-driven unit supplies air in proportion to its speed. Under certain operating conditions, it could be "fighting" the carburetor and upsetting the normal air flow pattern that maintains the correct air/fuel ratio. A typical case could be full engine speed at low to moderate load. The blower would be trying to deliver maximum air while the carburetor ahead of it is trying to restrict flow and limit fuel.

Stewart & Stevenson engineers solved this problem with a special valve on the blower inlet. This valve is connected to the engine's intake system so as to permit automatic control of the air/fuel mixture with partial recirculation under varying conditions. In this way, the desired pattern of carburetion is maintained and harmful effects of high blower inlet vacuum are avoided.

One change from the original design is the use of dual carburetion on 6-cylinder and larger models. Also, a change was made in the compression ratio by modification of the cylinder heads. This permits pulling full rated power, particularly when ambient temperatures get high, without worrying about detonation.

These are major features of the final modification kit design. Other minor ones were also made. The result is good operation of the Series 71 engines over a range of speeds from 800 to 1800 rpm. Continuous horsepower rating is the same on natural-gas operation as for diesel operation. Fuel consumption is reported to be excellent. The same applies also to response to sudden load changes, as well as lugging ability.

Gas engines or kits available . . .

The complete line of Series 71 engines, from 40 to over 1400 horsepower, is now available from Stewart & Stevenson as spark-ignited, natural-gas engines. Or you can get kits for conversion of existing engines in the field. The conversion can be made in about four to five hours.

Major kit components include: (1) An exchange cylinder head, complete with adapters and spark plugs; (2) natural gas carburetor with adapter for installation on blower and one for air cleaner attachment; (3) special valve assembly for partial automatic fuel/air ratio balance and adjustment; (4) magneto or distributor ignition set with wires; (5) necessary linkage from governor to carburetor and throttle; and (6) a back-fire flame arrestor.

Summary

Stewart & Stevenson has extended the scope of "Jimmy" application into the area of spark-ignited natural-gas operation. The conversion kit has been engineered to provide the same flexibility, performance and service life demonstrated by the diesel versions. A significant advantage is that in a matter of a few hours the same engine can be changed from one type of operation to the other to suit localized conditions.

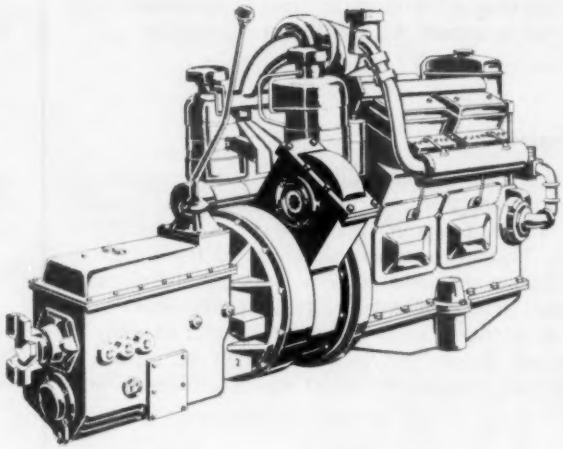
It all adds up to a whole new potential for Series 71 engine application thanks to this product of Stewart & Stevenson's aggressive engineering.

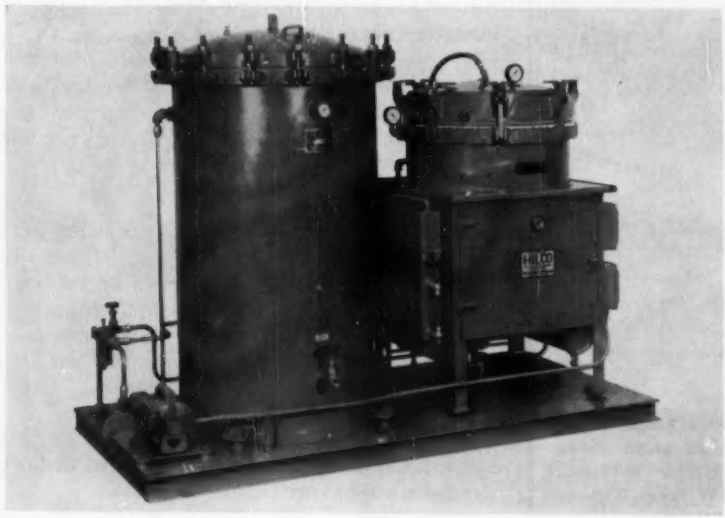
diesel power

new products

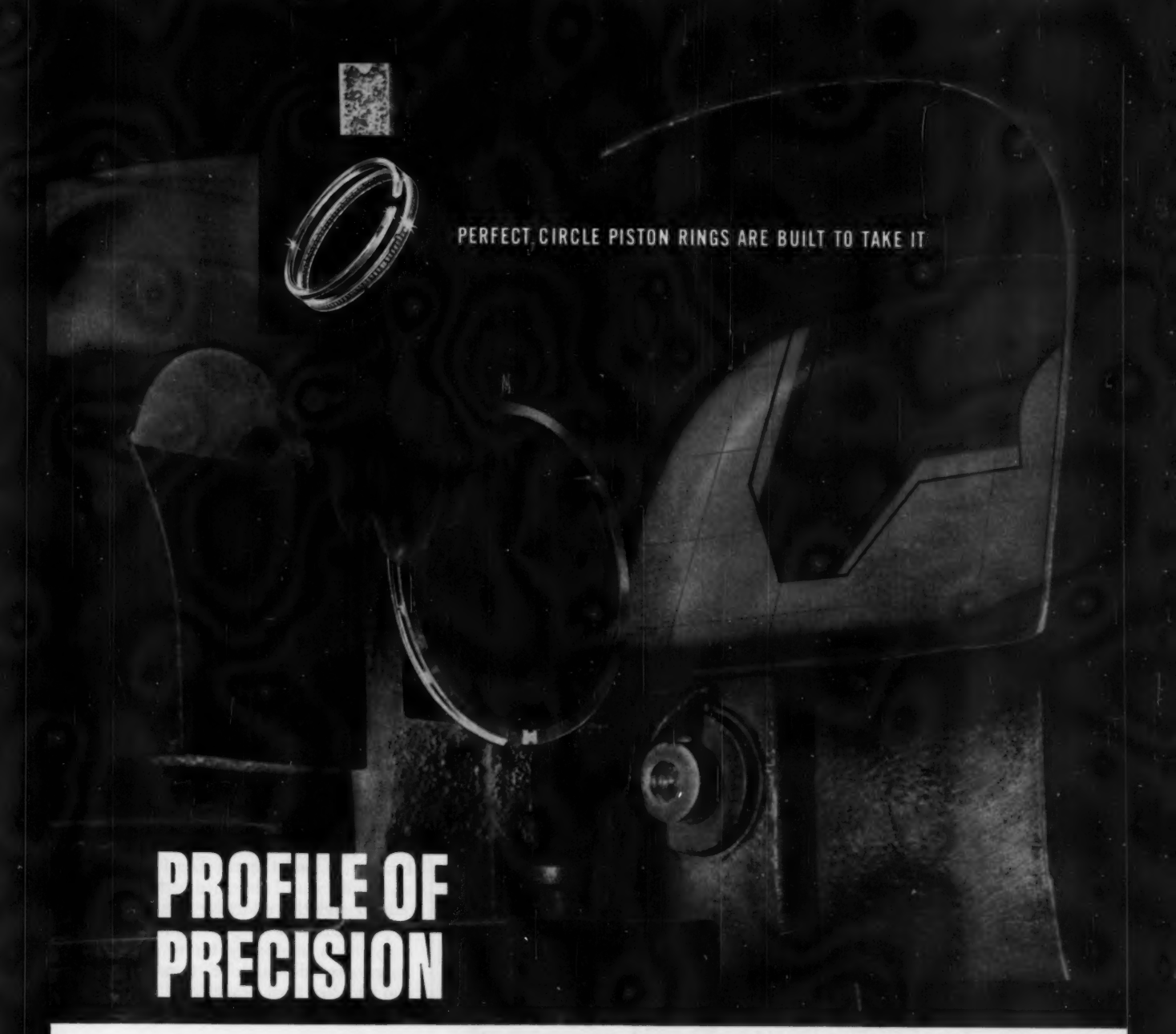
Allis-Chalmers' Biggest Tractor Loader
TL-30 has a 10,500-lb carrying capacity and a maximum lifting capacity of 25,000-lb. Single lever power shift permits shifting on-the-go at any speed and in either forward and reverse. Power is A-C turbocharged "11000" diesel, rated 184-hp @ 2200-rpm. Other features are hi-traction differential that transfers power to wheel with best bite, and an automatic clutch cut-off that delivers full engine power to the hydraulic system at the touch of the brake pedal. Accessories include special buckets, lift fork, backlifter blade, etc.

200-hp from Flywheel PTO
A heavy-duty flywheel PTO designed by Cotta Transmission mounts independently between engine flywheel and master clutch. Power can be taken off even when clutch is not engaged. 200-hp can be taken from engines rated up to 400-hp, eliminating the costs of auxilliary engines and "service-heavy" shafts. The unit adds only 12.25-in. to power train length, adapts simply to any engine without alteration of other power train components. Standard mounting front and rear is either SAE #1 or #2 housing. Straight-through shaft transmits engine power to master clutch. Three helical gears deliver power from main shaft to power take-off output shaft. Increases versatility of generators, etc.





Filter-Reclaimer
Hilliard Corp's motor pump set of practically any capacity forces oil through filter with either all or part diverted to the reclaimer, for removal of moisture and volatile components. Either filter-reclaimer or filter alone can be hooked up. Flexibility permits restoration of practically all types of lube and industrial oils to new oil condition. Various filtering media are available to handle specific types.

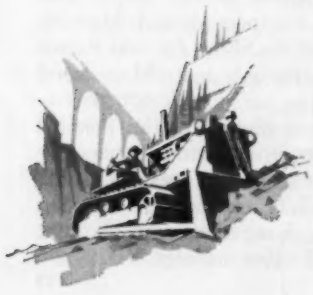


PROFILE OF PRECISION

You are looking at the profile of a piston ring magnified many times on a powerful comparator. These highly-accurate optical devices are used in the factory to compare finished rings with standard dimensional specifications.

The comparator is but one of the many sensitive instruments employed by Perfect Circle to maintain uniform high quality in all production rings. Such precise control of machine operations assures you of better ring performance.

Whatever the need, Perfect Circles are built to take it. Put your trust in the ring preferred by more engine makers and mechanics than any other—Perfect Circle.



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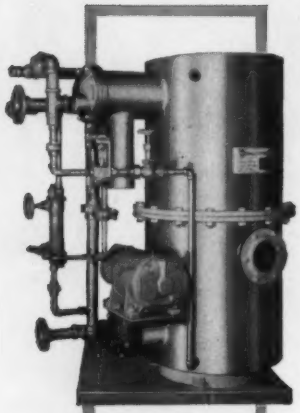

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FOR DIESEL OWNERS

AQUAVAP Heat Recovery Evaporators depend on engine jacket water, or any other hot water as a heat source. Hence they produce fresh water from available sources of salt or brackish water without any extra fuel cost. They are low in initial cost, inexpensive to maintain and simple to operate. They are delivered as a complete packaged unit ready to install. There are 5 models in the Aquavap line with capacities ranging from 150 gallons per day to 12,500 gallons per day. Other AMF-Maxim evaporators are available with capacities ranging up to more than 1,000,000 gallons per day. The purity of water produced exceeds U. S. Dept. of Health requirements.

Wherever Diesels are used, or wherever hot water is available, the Aquavap is an extremely practical water producer. It is ideal for many uses such as remote mining operations, construction camps, offshore or land based oil drilling, workboats, yachts, coastal resorts, military installations, and a multitude of others. Write for our illustrated Aquavap Bulletin.

AMF MAXIM EVAPORATOR DIVISION
American Machine & Foundry Company
WATERFORD, CONN. • Branch, DENVER, COLO.

For more information write in No. 118

NEW PRODUCTS . . .

Mini-Mag

A compact magneto ignition system is available from Mallory Electric. Designed for 4, 6 and 8-cyl automotive engines, its application extends into the natural gas field, providing the spark for spark-ignited gas engines. According to Mallory, it requires very little maintenance and has excellent performance curves.

150

External Tank-Type Heater

A thermostatically-controlled external tank-type heater has been added to Phillips Mfg. Co.'s line. The unit serves as an automatic cut-off should overheating occur, and as a recirculator for quick warmup. Six models from 450 to 2000-watts are available, in either 115 or 230-volts. Each unit is packaged with complete fittings.

151

Eimco's 103 . . .

Eimco's 103 Tractor Series is powered by 100 hp GMC Detroit Diesel or Cummins engine. Series includes the 103 Tractor and Bulldozer, the 123 Front End Loader, the 133 Steel Mill Front End Loader . . . and the 143 Log Loader. A full 17-in of clearance between ground and the underside lets the 103 maneuver in rough terrain.

103 has a single-stage torque converter, 4-speed "Unidrive" transmission and dual final drives.

152

Reach for the New Devcon Repair Kit

For repairing castings, valves, pumps and all types of industrial machinery, try the new Devcon F Repair Kit, containing a new material believed to be the strongest, toughest, and most versatile available today.

First shown at the recent Production Engineering and Machine Tool Builders Show, Devcon Repair Kit was the only material on hand for "putting on" metal. Actual demonstrations illustrated the possible economies in time and money.

Simple to use, it does not shrink and exhibits tremendous adhesion to steel, iron, aluminum, bronze, glass and other surfaces.

153

Allis-Chalmers' TR-160 . . .

Allis-Chalmers has added a new all hydraulic TR-160 rear dump motor wagon to its construction machinery line. New unit has a carrying capacity of 12 tons. Unit is powered by a 6-cyl A-C turbocharged

154

Visual Magnetic Control For Efficient Truck Control

Methods Research Corporation offers a new Magnetic Control Board, providing visual records that are easily changed . . . easily seen.

Schedules and controls truck loading and movements over the road, controls location within large terminals, checks schedules, inventory, traffic, and almost anything else that will help make your operation more efficient and easier to handle.

There's a magnetic steel board holding the visual elements that you need. Magnetic elements are made of Alnico or Indox Magnets and are guaranteed for a lifetime of operation. The standard size of the board is 24-in. by 36-in. But, it can be built to fit your needs.

155

A-C's New HD-3 . . .

Allis-Chalmers expands its crawler tractor line to include a new compact unit—the HD-3, powered by a 4-cyl diesel with a 3-9/16 by 4⅜ bore and stroke and a 15.35:1 compression ratio. Engine is rated at 1650 rpm.

156

New "Motrac" Crawler . . .

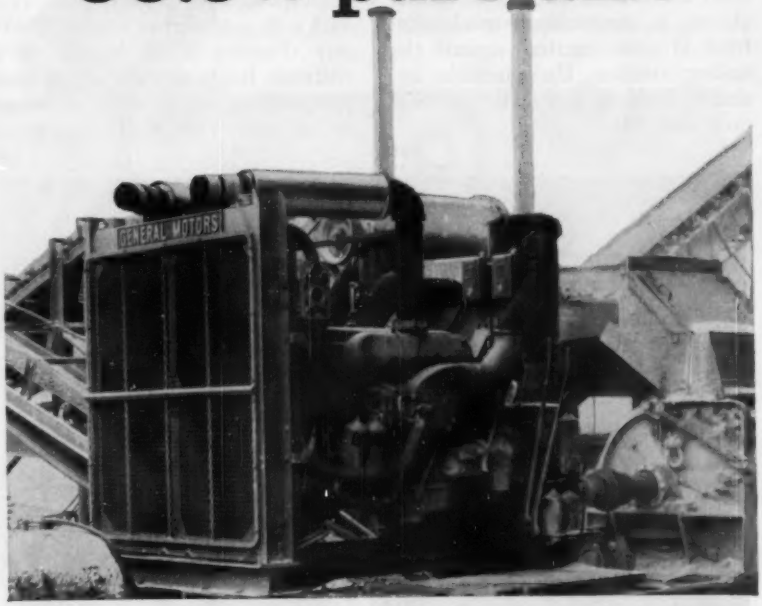
A new 59-hp crawler tractor from Minneapolis-Moline has torque converter and instantaneous full-power reversing shuttle. The Moline-built diesel has been fully integrated with the 5-speed Moline-built transmission in this new crawler. Five forward speeds range from 1.3 to 7.25 mph, with a 25% increase in five reverse speeds up to 9.07 mph. It's claimed to be the fastest in the industry today!

Motrac's 4-cyl diesel delivers 53 hp at 200 rpm. Basic frame is electric-welded heavy steel channel supporting engine, transmission and final drive assemblies, with a full steel "belly plate" to protect the engine and transmission.

157

Crusher dust gets so thick you can't breathe . . . but

Donaclones deliver 99.9% pure air!



Now factory equipment on many leading makes of engines

Dust gets so thick around this ag limestone plant, it often hides the equipment. Diesel engines on crusher and hammermill used to require frequent overhaul with expensive downtime.

After Donaclones were installed, engines were operated according to the previous overhaul schedule and then examined. *They showed practically no signs of wear.*

The Donaclone's primary centrifugal cleaner removes 98% of the dust. Only 2% remains for the Duralife paper filter giving it an extra-long service life. And it can be renewed when necessary, by dunking in water and detergent.

Add years of engine life by modernizing with Donaclones.

Write for name of dealer

Side inlet model

Center tube model

Donaclone by **Donaldson**

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For more information write in No. 119

Sealing

A line of internally-expanded Teflon seals has been developed by Tanner Engineering Co. Normally, this material tends to shrink away from the surfaces when cold. Tanner claims a continuous mechanical force is now exerted against the sealing surface. Uses include hydraulic seals, piston seals, electrical dust seals, etc.

158

Severe-Service U-Joints

A line of booted universal joints has been especially developed by Lovejoy Flexible Coupling Co. for severe service, including heavy-load high-speed and/or high heat; contact with dust, dirt or contaminants; any situation where lubrication is difficult. Joints are covered, allowing pre-packing, are available in standard or heavy-duty, up to 230-hp.

159

Speed Switch for Alternators

Torq Engineered Products has a bulletin for you describing how their speed switch regulates alternator output. The switch makes possible a two-speed alternator drive providing proper electrical current regardless of variable truck engine speed driving the alternator.

160

Be Forewarned!

A new safety device by McCord, called Safe Level Sight Feed, gives warning that entrained air is in the oil. This can stop oil feeding of a lubricator. Unit features quick priming without disconnecting the oil line, and it is unnecessary to disturb the sight feed glass when servicing the lubricator feed.

This new unit comes installed on all currently manufactured McCord model "55" force feed lubricators and may be field installed on any existing models.

161

Accurate Sensor Switch

No larger than a cigarette, a new Liquid Level Switch by Liquidometer is available for liquid storage tanks—fuel oil, water, etc.—in industrial application. It serves as high or low level warning and control, leak detection, and for flow monitoring diesel fuel, for example.

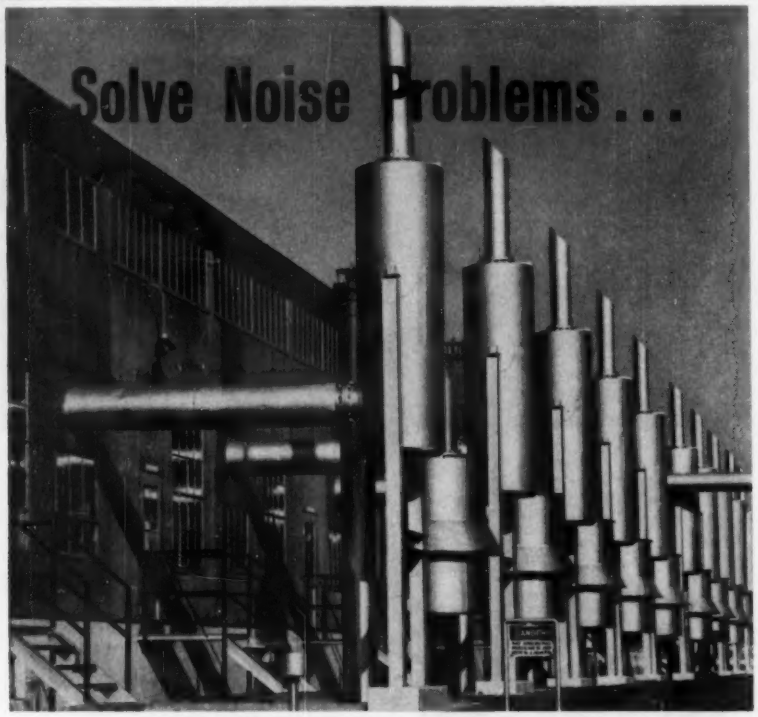
Supplied with separate probe and control unit, or the two combined, the probe temp. range is −195° to +250°C., and the control unit has a range of −65° to +100°C. There are no moving parts.

162

Waste Heat Recovery!

The SANEA waste heat boiler, specifically designed for use with exhaust heat from diesel engines, is designed for high heat recovery and low maintenance. The manufacturer claims economy due partly to continuous cleaning of the heating surfaces. Other factors include easy coil exchange, accessibility for inspection, sootblowing during operation, and freedom from vibration. Available in sizes from 1100 to 6100 lbs. of steam per hour, it can also be custom ordered.

163



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There's no need to go-it-alone when your design problem deals with noise suppression. You can save time and money by putting a MAXIM engineer on your team.

He is a specialist in designing silencers to meet noise problems of all types of engines from giant diesels to "go-karts," as well as special purpose silencers for jet aircraft, atomic submarines, waste disposal plants, chemical plants and heat recovery applications.

Let us know your problems . . . we will work with your engineers . . . on your team . . . to solve them.

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For more information write in No. 120

Use your dp Reader Service Card.

Standby Battery Charger

Lake Shore Electric Co. announces a new continuous-duty battery charger designed primarily for use with stationary standby equipment. You can maintain batteries at safe operating levels during standby periods and have an optional relay control to cut out the charger when the engine is started.

It is adjustable from 50 millamps to 2 amps output at 6, 12, 24, or 32 volts; and a tapped input transformer, with convenient terminal block, permits the charger to be used with any power source.

164

LeTourneau-Westinghouse's Grader Powered By "Jimmy" or Cummins . . .

This new motor grader, LeTourneau-Westinghouse's model 330-H, has a choice of power. Either the 100 hp GM 3-71 or the Cummins 100 hp V-6-BI engine. The 330-H utilizes a heavy-duty constant mesh transmission with 8 forward speeds, up to 23.6 mph. Creeper gears are available as low as ¼ mph. There's 4 reverse speeds, ranging from 1.7 to 12.2 mph. Weight, with standard equipment, is 21,690 lb for the GM diesel . . . 22,090 lb for the Cummins. Engine is rubber-mounted to eliminate vibration to the frame.

165

The right size . . .
The right time . . .
With Marman Clamps

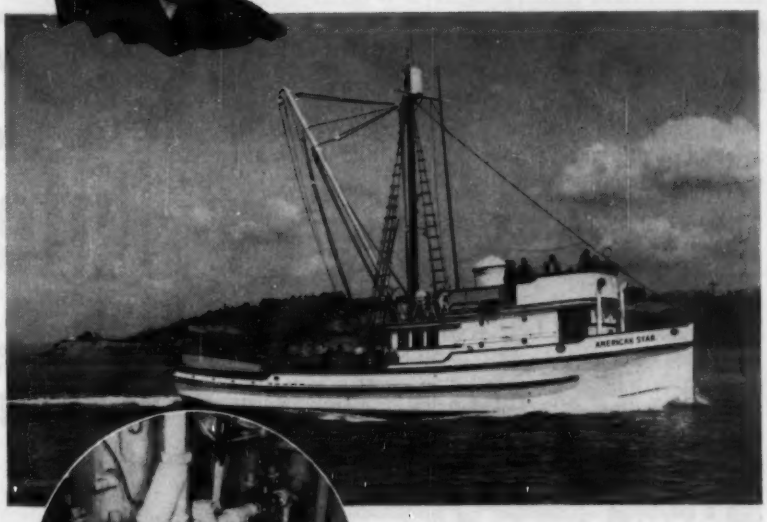
Whatever the size or type of engine, Marman Universal Band Clamps handle all replacements of hose connections on waterlines, air-cleaning and manifold lines. This is what Waukesha Engine Company has found to be true in their Huntington Park maintenance shop for periodic servicing and repair.

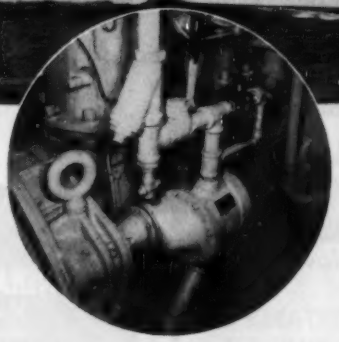
In addition, Universal Band Clamp simplifies Waukesha's stocking problems. Only four sizes needed, from ¼-in. to 16⅛-in.

In this shop, with many different sizes and types of engines being serviced simultaneously, the right size Marman clamp is always available. Easy to install, no tools! Adaptable, too!

166

"the AIR STARTER has never failed us in two years of fishing!"





The "American Star" is a 70' Pacific Coast type herring and sardine seiner. It is powered with a 335 hp Waukesha Defender Diesel. Note compact installation of the Ingersoll-Rand Size 20BM Air Starter.

Captain Edwin Hausen began his fishing career in 1928. He is held in high regard by his fellow skippers and the fishing trade. Here's what he says about air starters . . .

"I do not pretend to be an authority on such equipment. I simply judge the air starter by the way it does its job. We have used the Ingersoll-Rand Air Starter for two years and it has never failed us!

"The American Star's engine is not a small power plant, for its displacement is 2,894 cubic inches. The Ingersoll-Rand Size 20BM Air Starter is about as positive a system as you can find. What's more, it's simple in operation, compact in design and reliable."

Ingersoll-Rand Air Starters are made in 4 sizes for engines from 300 cu. in. to 20,000 cu. in. displacement. For complete information on these highly efficient starters, write for your copy of "Go Modern—Start with Air," Form 5094E.

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

209A-18

For more information write in No. 121

There *Has* to be an Angle!

Remove rusty or frozen nuts, regardless of interferences in close assemblies with Borroughs new "Nut Buster". Do it all, with no damage to threads or bolts in a matter of seconds.

The tool is made of Federal spec. cast steel, hex shaft 3½-in. long, flat at one end, providing a round opening that fits over the rusty nut. Running lengthwise through this shaft is a chrome-moly tool steel bolt with a cutter at one end and a hex head and threads at the other. Cutter can split more than a hundred nuts before it's necessary to resharpen it by grinding.

Top priority in the "virtue" department is the fact that the "nut buster" is set at an angle at the place where the part that fits around the rusty nut joints the hexagonal shaft. Gets in easily at counter sunk nuts, close assemblies, and close groups of bolts. Should be a natural around maintenance shops.

170

"Big MO 500"

Fast, rugged and designed for general purpose highway and construction jobs, a new series of wheeled industrial tractors, called the Big Mo by Minneapolis-Moline, are powered by 206 cu in Moline 50 bhp (at 1750 rpm) diesels. Tractor has heavy-duty axles and frame to handle any highway and construction attachments including dozer blades, crane hooks, mowers, backhoes, leaders, and several types of buckets including ejector, trench, bell-hole and material and snow buckets.

Instant shifting and reverse speeds with the Big Mo 500 reverse shuttle gear accelerate loading work by approximately 50%. Reverse speeds (up to 18.22 mph) are 25% faster than forward speeds, Moline engineers report.

Five forward speeds on the "500" range from 2.63 to 14.57 mph, with the five reverse speeds ranging from 3.29 to 18.22 mph.

167

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SIMPLEX PORTABLE OIL TESTING KIT

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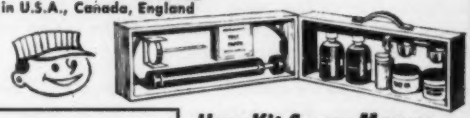

Here Are A Few Simplex Kit Users:

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U.S. Steel Corporation
Curtis Bay Towing Co.
A.C. Spark Plug Div., G.M.
U.S. Army Engineers
Superior Transport, Inc.
MacMillan Oil Company
International-Harvester Co.

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1. Tests motor oil on the job. Gasoline and Diesel engines. Easy, quick, accurate, 5¢ a test!
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For more information write in No. 123

You Can Be Sure . . . With Cummins New Lubricating Oil Filter Element

Cummins Engine Company has introduced a new lubricating oil filter element for 750 and 500 cu in. by-pass type filters after extensive tests in automotive and industrial applications.

Designed and manufactured by Cummins, it features special construction for extra strength and rigidity, exclusive high quality media for a uniform efficient filtration and extra large perforations for uniform oil flow. It all adds up to outstanding dependability . . . a containter of superior construction..

Large oil flow area is greater than any known competitive model, but media can't work through the openings. Filter media is prepared through special methods insuring a uniform mixture throughout the element. Cummins packing method makes for uniform, consistent filtration adding to filter life. No additives either. Perfect for compound oils.

171

On the Go in Ice or Snow! Mack Single Axle Power Divider Makes Weather No Object

Mack Trucks has announced that it is using a single axle power divider for four-wheel trucks which insures positive traction under adverse conditions.

The CRD 781 Power Divider Differential is an adaptation of the power divider available only with the twin-axle bogies used on six-wheel Macks.

Under normal conditions, it acts as a true differential, maintaining the driving element's constant average speed at the wheels. However, when traction is lost at one wheel, spinning is prevented by a transfer of torque to the wheel retaining traction, preventing stalling. The entire operation is automatic . . . all the dangers of the present manually controlled systems are eliminated.

Come ice or snow, schedules can be maintained, cost of installing and removing chains virtually nonexistent. Saves on general maintenance, too, since no undue stress is placed on any working part.

172

Use your dp Reader Service Card.

Generator-Regulator Tester

Simpson's Auto-Ranger GRT has a built-in brain that makes it automatically adaptable to every hook up and voltage normally encountered. All readings are automatic: no interpretation required. Helpful in cutting electrical system failure in trucks, a major cause of breakdown.

173

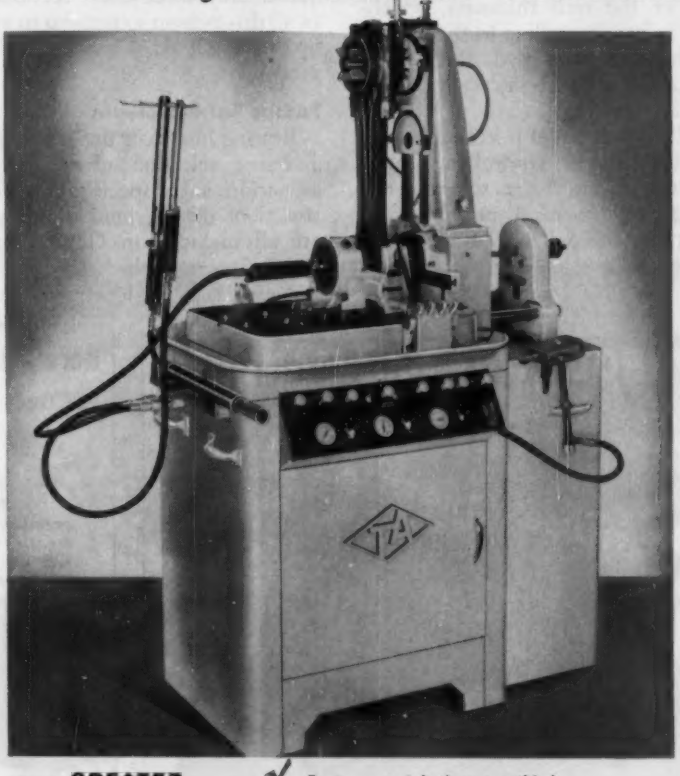
Magnetic Pick-Up

A line of extra-powerful magnetic tools are being marketed by Ullman Devices Corp. Called Magimmick, models are available in 360° swivel, rigid or flex shaft. All models are chromed. A good tool for getting at nuts, bolts and washers that drop into hard-to-get-at places.

174

New TOBIN-ARP

Diamond Boring PIN FITTING MACHINE



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For more information write in No. 124

diesel power

new literature

New Data Memo Published By Superior Tube

Diesel fuel injection tubing for injection systems with working pressures from 3000 to 9000 lb per sq in. is taken up in Data Memorandum No. 10, published by Superior Tube Company.

Tests and inspections assure a smooth bore of accurate size with no fissures, crevices or other imperfections deeper than .005 in. or 5% of the wall thickness, whichever is less. According to the memorandum, superior hydrostatic pressure tests all fuel injection tubing to 5000 psi.

All Superior fuel injection tubing is annealed in controlled atmosphere furnaces to a soft, ductile temper. Mechanical properties of both C-1008 and 4615 tubing supplied in this temper are listed. The seamless steel tubing has had the Inside Diameter conditioned to remove fissures and other defects.

175

On V-Belts

An 8-page bulletin from Manhattan Rubber Div. of Raybestos-Manhattan outlines special design for heavy and light-duty short and long-center V-belt application. Described are serpentine drive arrangements, notched belts, high-speed drives and a poly-V drive that requires only three cross sections to fit all drives from 1/20th-hp to 1700-hp. Take a look.

176

Pumps For Petroleum

Bearing life, shaft deflection data, a frame selection chart, as well as performance, specifications, construction details, and dimensions are all included in Gould Pumps new 16-page booklet. The pumps are especially designed for petrochemical and petroleum refining industries, but booklet is useful and interesting for related fields. Booklet free on request.

177

Generator Controls

"One Source Responsibility", from Lake Shore Electric Co., features their "Unified Control", combining generator control circuits, transfer switch and optional automatic engine control panel and battery charger. All equipment is for portable and standby power. Booklet illustrates the compactness and economy possible with the simplified designs.

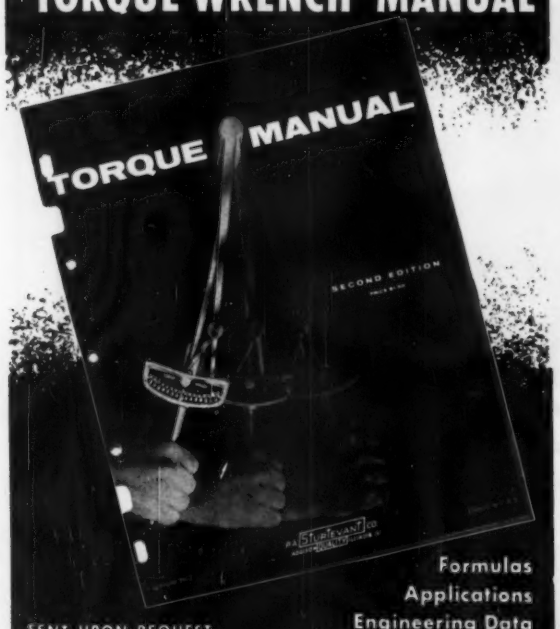
178

Considering An Emergency Generator?

A new bulletin covering every phase of planning and engineering prior to actual installation of emergency generating equipment has been printed by the Onan Div. of Studebaker-Packard. Intended as a guide to point out the more common problems arising in standby installations, it includes several pictures and a diagram. Free on request.

179

"TORQUE WRENCH" MANUAL



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Here's the *latest* equipment for

Precision
NOZZLE RECONDITIONING

It's from Hartridge, naturally! Three new units to permit *complete* nozzle service work with lowest investment. Yet units are so advanced that they are a necessity for the modern Diesel service shop, or the O.E.M. Write or call today for complete information!

HARTRIDGE NOZZLE RAPIDLAP
Provides a high-speed seat lapping process with Hartridge laps and lapping compound. Ideal for polishing precision injection parts. Dual spindles give two lapping speeds. Quick-action, key-less chucks. Swivels on base. Chuck head moves to three positions.

HARTRIDGE NOZZLE MULTICLEAN
Combines oil and air cleaning in a double flushing operation. Accommodates all nozzles from the small, popular type to large marine sizes. Illuminated magnifying glass for close inspection of spray holes.

HARTRIDGE NOZZLE TESTMASTER
Compact, hand-operated bench model for standard-type single or multi-hole nozzles. Has illuminated spray cabinet, fume exhauster, quick-action nozzle clamps, finger-tip control valves, seconds timer, modern pump unit, and stabilizer for dry seat, chatter, and atomization tests. Fast and accurate.

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USG Bulletin Offered

US Gauge photographically catalogs its line of pressure gauges, thermometers and control instruments in Bulletin 3020.

In six color pages, the booklet describes the bourdon-tube type pressure gauges in a wide variety of industrial applications. Illustrated too are dial and glass tube thermometers, panel type and multi-angle models and indicating controllers, valve positioner and pilot options, recorders, chemical attachments and accessories.

Text covers information on construction, dimensions, ranges, accuracies and typical applications.

180

Filters . . . Subject of Air-Maze Bulletin

Oil bath air filters for locomotive air compressors are taken up in a new illustrated bulletin available from Air-Maze Corp., a subsidiary of Rockwell Standard.

Describing the operation, construction and design features of the heavy duty air filters made for either Westinghouse or Gardner-Danver locomotive compressors, the company has also included full service instructions.

Pictures show cutaway and exploded views of the filters as well as the filters in use on the compressors.

181

Cuno Publishes Introduction to New Filter Cartridge

Bulletin No. MW-100 tells the story of Micro-Wynd, new Cuno filter cartridge designed to achieve a perfect balance of filter-ability and body strength. It's what's inside that counts! Important construction refinements within step up filtration efficiency!

The bulletin includes diagrams, illustrations, user test reports and list of most fluids that can be filtered through. Specifications, micron densities, and fluid compatibility are included too. The people over at Cuno Engineering expect a vote of approval from diesel fuel users. See what they have to say about it.

182

If You Use Hoses

Aeroquip Corp. has printed a reference bulletin for a quick guide to their hose assembly numbers, covering the various categories of end fittings for low, medium, high and very high pressure, and for Teflon asemblies. It also tells which hose types to be used with each type of fitting and is pre-punched for insertion in any standard binder.

183

Engine Balancing . . . A Case History Report

Available to fleet operators is a case history report from Bear Manufacturing Company showing how Burlington Truck Lines saved $6-thousand the first year by balancing drive shafts, crankshafts, and flywheels on 2500 units.

Although specific to a gasoline engine fleet, the principles and benefits apply equally to diesels.

Report explains how the Bear Balancer increased engine life 25% and reduced teardown time 20%. It is fully illustrated.

184

Flexible Hose Products Catalogued

A new 20-page catalog tells the whole hose story by Universal Metal Hose Company. Profusely illustrated, the booklet covers applications-use and specifications with coupling recommendations for the Universal U-200 and U-250 Series for conveying searching gases and fluids like steam, hot oil, gasoline, liquified gases, refrigerants, chemicals, etc. . . . wherever, in short, leak-proof hose construction is a MUST!

Photographs show the company's product controlling vibration, compensating for motion or misalignment under high temperature, pressure, vacuum or abrasive conditions. Check its use with a diesel engine. The U-190 and U-190S corrugated all-metal flexible diesel engine exhaust tubing is detailed. Complete with charted specifications and installation data.

185

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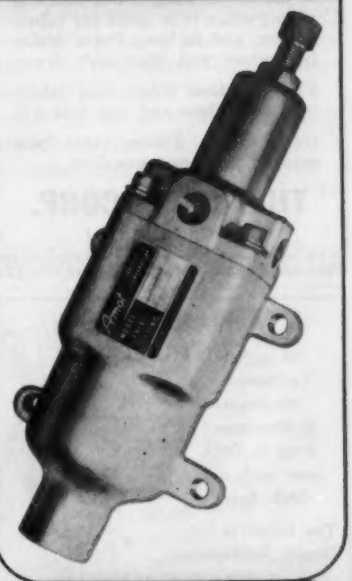

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NEW LITERATURE . . .

Cleans Heavy Dirt

Oakite bulletin describes the action and properties of their heavy-duty RR Cleaner. If you clean or degrease parts, you'll pick up a few tips. For example, the metals that are to be cleaned are a factor. Look before you leap. **186**

S & S Ground Power Units Keep 'Em Flying!

Behind the swift new giant jets, there are very likely ground support units by Stewart & Stevenson Services. Over a 20 year period, S & S has been making more and more successful diesel and gas engine power applications.

All that know-how is being applied to aid in not only the development of commercial aviation, but in our nation's missile, radar and rocket programs as well.

The story can be found in a new 6-page, 2-color brochure, illustrating and describing the trailer, tractor and truck mounted units available . . . and with a diesel designed for each! **187**

NEUC Participation Invited!

The National Engine Use Council has an attractive 8-page booklet that tells you its objectives and its programs to implement them. The Council was recently formed and is already attracting widespread interest throughout the diesel industry and its suppliers. Stated simply, its purpose is to provide an organized effort to promote the internal combustion industry and expand its potential.

There is a vital need for an alliance of the industries interested in the sale and application of internal combustion engines. Its present concept will provide, for the first time, opportunity for the industry to act as a whole and objectively promote its best interests.

If you're interested in expanding your potential markets whether it be for engines, fuels, lubricants or accessory equipment you need this Council and the Council can use your interest and support.

The next meeting is May 1st, 9 A.M. at the Chicago Youth Club. Be there if you can, and write for the free booklet. **188**

To Measure Pipe & Tube

Aeroquip Corp.'s 16-page booklet "How to Measure and Relate Pipe, Tubing and Hose Sizes" supplies standard methods of measurement, discussing measurement of various fittings and fluid-carrying lines. Standard practices and dash numbering systems are discussed. **189**

FULTON SYLPHON SAFETY CONTROL—MODEL 530 BRAND NEW . . . $55.00!

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NEW LITERATURE . . .

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On Light Diesels

A new series A-L of Yanmar Diesels for land use is described in this illustrated booklet. Design specifications and performance curves are included for these compact and light weight engines. Find out about these engines, which are distributed by Continental Machinery Co.

190

Grinding Wheel Specs

Hall-Toledo has just released a Grinding Wheel Specification Manual that's yours for the asking. Provides a quick-reference in chart form of all pilots and grinding wheels for exhaust and intake valves for all makes of engines, grouping American-made cars and trucks in one section, road machinery and miscellaneous equipment separately, and foreign vehicles in another. Pre-punched for insertion in your reference binder, it also includes full info on all optional equipment and accessories.

191

Take Not Your 'Phone Service For Granted!

Published periodically by Cleveland Diesel, the February issue of "Diesel Times" tells you the story of their emergency generator installations in various phone companies throughout the world. The units supplied by Cleveland vary from 300kw to 1250kw, and some can restore power in less than ten seconds. Many pictures and diagrams are included and if you are interested in this free 8-pager, just mark your reader's service card for a copy.

192

C-B's Superchargers

Cooper-Bessemer's "LSVEngines", their newest 4-page brochure, describes operating characteristics of their 12 and 16 cylinder supercharger LSV engines. These versatile V-type, 4-cycle engines are normally aspirated for 1650-hp to 2700-hp, and supercharged for 2150-hp to 5450-hp. Brochure shows cutaways of the engine and gives full description of fuel systems and major design features.

193

Exhaust Part Line

A catalog issued by Alexander-Tagg Industries illustrates and describes their line of heavy-duty exhaust system parts and accessories, manufactured to give long-life in big-inch engine usage. Fifteen parts and accessories are shown and described.

194

It's All in the History

Case History, that is! Oxy-Catalyst takes up 11 problem solution case histories of typical Oxy-Catalyst exhaust purifier installations in a new 4-page booklet, "Clean Up Your Exhaust Fumes with Oxy-Catalyst Exhaust Purifiers."

Included are descriptions of how carbon monoxide, cancer suspect hydrocarbons and other exhaust fume problems were solved. Installations examined were in a steel mill, food warehouse, tool storage cave, ball bearing plant, limestone mine, underground constructions and a warehouse. The catalyst purifiers were on diesel shovel loaders, power sweepers, lift trucks, and other typical equipment.

195

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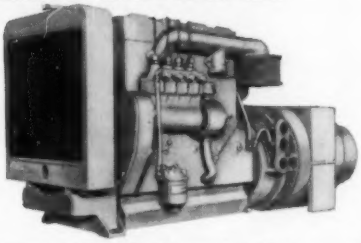

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